REPORT RESUMES

ED 016 309 EA 001 190

SYSTEMS FOR MEASURING AND REPORTING THE RESOURCES AND
ACTIVITIES OF COLLEGES AND UNIVERSITIES.
BY- HENLE, R.J.
NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C.
REPORT NUMBER NSF-67-15 PUB DATE JUL 67
EDRS PRICE MF-$1.75 HC-$18.24 454P.

DESCRIPTORS- *COLLEGES, *UNIVERSITIES, *MEASUREMENT TECHNIQUES, *INFORMATION DISSEMINATION, EDUCATIONAL RESOURCES, SCHOOL ACTIVITIES, *INFORMATION SYSTEMS, DATA COLLECTION, PERSONNEL DATA, PROFESSIONAL PERSONNEL, EDUCATIONAL PHILOSOPHY, SALARIES, FEDERAL AID, STUDENT RECORDS, FACILITY INVENTORY, BUDGETING, COSTS, INFORMATION STORAGE, DISTRICT OF COLUMBIA,

THIS STUDY WAS DESIGNED TO DEVISE AND TEST SYSTEMS OF MEASURING AND REPORTING ACTIVITIES IN COLLEGES AND UNIVERSITIES SO THAT SUCH INSTITUTIONS COULD MAINTAIN RECORDS ADEQUATE BOTH FOR THEIR OWN PURPOSES AND FOR REPORTING TO INTERESTED AGENCIES. DATA CONCERNING MANPOWER, STUDENTS, FACILITIES, AND FINANCES COVER ALL FIELDS OF UNIVERSITY ACTIVITY AND ALL MAJOR COMPONENTS OF THE UNIVERSITY. THE EIGHT INSTITUTIONS STUDIED WERE SELECTED FOR THEIR GEOGRAPHICAL DISTRIBUTION, DIVERSITY OF SIZE AND TYPE, AND RANGE OF ACADEMIC PROGRAMS. FIVE GENERAL IMPLICATIONS OF THE STUDY ARE NOTED--(1) COMPREHENSIVE ATTACK ON ADMINISTRATIVE PROBLEMS OF HIGHER EDUCATION WARRANTS FURTHER APPLICATION, (2) INSTITUTIONS SHOULD FORMULATE THEIR EDUCATIONAL OBJECTIVES AND ANALYZE THEIR OPERATIONS IN THE LIGHT OF THESE OBJECTIVES, (3) THE GUIDELINES EXPRESSED IN THIS REPORT MAY MAKE POSSIBLE THE ESTABLISHMENT OF A BODY OF EVIDENCE FOR EVALUATION OF EDUCATIONAL EFFECTIVENESS OVER A LONG PERIOD OF TIME, (4) FORMAL ANALYTICAL STUDY OF UNIVERSITY STRUCTURE FROM THE STANDPOINT OF DATA COMMUNICATION IS NEEDED, AND (5) ANY PHILOSOPHY OF THE MODERN UNIVERSITY MUST BE INFUSED WITH SUCH WISDOM AS IS WITHIN THE CAPABILITY OF MAN, AND PRACTICAL PROCEDURES MUST BE FOUND TO ASSIST ITS REALIZATION. THIS DOCUMENT IS ALSO AVAILABLE FROM THE SUPERINTENDENT OF DOCUMENTS, U.S. GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 20402, FOR $2.00. (HW)

ED016309

Systems for Measuring and Reporting The Resources and Activities of Colleges and Universities

National Science Foundation
NSF 67-15

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

Systems for Measuring and Reporting The Resources and Activities of Colleges and Universities

National Science Foundation
NSF 67-15

FOREWORD

The importance of higher education to our society and our economy is obvious. What are not so obvious, however, are the ways and means by which we can most effectively meet the constantly increasing costs of our colleges and universities, resulting from the accelerating volume of enrollments and the higher costs of buildings, books and salaries.

The financial support of higher education requires funding from many sources: appropriations by Federal, State and local governments, endowments, gifts, student fees and revenues from public service activities. Educational institutions have become increasingly concerned about the problem of record-keeping which has grown more complex as institutions increase in size and expand their instructional, research and public service activities. The need for more comprehensive, efficient and uniform accounting in the schools is pressing, not only for better management, but to provide the data required for reporting on their stewardship of the public and private funds which support their activities.

This report is the result of an effort by a group of representatives from eight universities, under the sponsorship of the National Science Foundation and the National Institutes of Health, to "devise and test systems of measuring and reporting activities in colleges and universities." As Father Henle, the coordinator, notes in his preface, the project was not an end but a beginning. It does not pretend to spell out the ultimate system, but rather presents the problem, the rationale, the main features which must be included in a data system, and suggestions regarding the specific items of data needed.

The National Science Foundation is happy to publish the report, in the hope that it will serve a useful purpose as a reference document and will stimulate further studies of the record-keeping problems of colleges and universities.

Father R. J. Henle, S.J., coordinated the project and the preparation of the report. Names, institutional positions, and affiliations of participants appear in Appendix A. Professor Philip H. Tyrrell of Rensselaer Polytechnic Institute served as editor for the final report. Our debt to the participating institutions, their representatives, and especially to Father Henle is gratefully acknowledged.

H. E. Riley
Head
Office of Economic and
Manpower Studies

July 1967

PREFACE

The idea for this Project developed from discussions at regional meetings called by the National Science Foundation to review, with university representatives, the questionnaires which the Foundation used in its college and university surveys. In particular, the idea was suggested at a regional meeting held at the University of Chicago in August 1959, and, after some preliminary investigation, was further considered at another meeting held at Saint Louis University in September 1960.

In brief, the problem which generated the idea for this Project involved the increasing need for accurate, current statistical data concerning the activities of colleges and universities, such data being urgently needed not only by many Federal agencies but also by institutions themselves.

After some months of exploring how best to attempt to find a solution to this problem, a study was designed to devise and test systems of measuring and reporting activities in colleges and universities, including all major components of such institutions and all fields of activity. It was to be a study about internal information systems, with concern that such systems have broad compatibility between institutions.

After approval of the proposal, the following five institutions accepted invitations to participate: the University of Arizona, the University of Florida, Michigan State University, the University of Pennsylvania, and Rensselaer Polytechnic Institute. For these institutions, as well as Saint Louis University, the Project was officially initiated in June 1961. Later in the year, the Texas A & M University

System joined the group, and, in 1962, the University of Washington also joined. The eight institutions were selected so as to obtain geographical distribution, diversity of size and type, and a wide range of academic programs.

Meanwhile, the National Institutes of Health indicated an interest in the Project and agreed to co-sponsor and co-finance it through the National Science Foundation's contracts.

The work of the Project spanned more than three and one-half years. Initially, the urgent need for some such investigation was much more in the awareness of those initiating it than was a clear-cut definition of the final goal. However, as the Project moved along, that original need which stimulated the undertaking grew steadily more pressing and continues to do so. There has been and will be vastly increased Federal participation in the planning and operation of schools of all kinds and at all levels. The educational establishment throughout the nation continues to expand at an even more rapid pace. New institutions are being founded, older ones are being redeveloped, and yet, on all counts, it is agreed that higher education is still not ready to meet the full demands of the next ten years. It is hoped that, in the areas covered by this report, the Project will have contributed toward meeting some of these demands.

Although activities to add data to the Project itself ceased during the many months required to prepare this report, in almost all the cooperating institutions the Project has given rise to continuing efforts to develop or improve internal information systems. Another significant by-product of the Project has been the development of personnel and staff knowledgeable in the broad areas covered by the study. In a sense, the Project has generated a whole series of further studies, tests, and demonstrations. Moreover, both formally and informally, the basic ideas of this study have moved out into other groups. Constant inquiries of, and visits to, members of the Project Group indicate that the release of this report will help satisfy an eagerness for ideas in this field and will most probably trigger a number of institutional innovations. Thus, the final goal envisioned and described by the Project - the concept of a total information system which would be broadly compatible between institutions - is, to some extent, being brought closer to reality through these continuing efforts. Looked at this way, the Project was not an end but a beginning.

As to the organization of this report, the nine chapters in Part I present the concepts that were examined or developed during the study. Chapter 1 gives the background and basic guidelines of the study, assays results, and presents over-all recommendations. In Chapters 2 through 6, major areas of data are identified and explored conceptually: academic and professional personnel data, student data, and facilities data. Chapters 7, 8 and 9 are conceived as organizing and integrating, from three different points of view, the data previously discussed. The five chapters in Part II provide materials that supplement the concepts presented in Part I. Part III contains reference matter.

If the reader wants only an overview of the areas covered by the study, he should read Part I, with an occasional reference, according to his interests, to Part II. However, if he wishes a conceptual overview, plus details on implementing selected data systems, he should read both Part I and Part II.

All the cooperating institutions contributed, via their representatives, to the materials which have gone into this report. However, various committees had major responsibility for the development of different areas of the study, and various individuals assumed major responsibility for compiling and writing particular sections.

The content of all substantial areas of this report was officially reviewed by each of the participating institutions and was given general approval. However, the finished report cannot be taken as conforming exactly to the views of any one university or any one individual. On most points, a general agreement was reached but not a unanimous uniformity. There still remain differences of opinion. Also, a number of questions have been left open as requiring additional experimentation and study. These questions have been noted in the report.

R. J. Henle, S.J.

Academic Vice President and
University Research Administrator
Saint Louis University

Coordinator of the Project

Saint Louis, Missouri
June 1965

CONTENTS

PREFACE ii

PART I

COLLEGE AND UNIVERSITY RESOURCES AND ACTIVITIES

1. A COMPREHENSIVE APPROACH TO DEVISING SYSTEMS OF REPORTING DATA ON UNIVERSITY ACTIVITIES 2

- Summary 2
- Problem 3
- Objectives 4
- Uses of an Information System 5
- The Project as a "Comprehensive" Approach to the Problem of Information 13
- Relationship of the Project to Previous Studies and Existing Systems 18
- General Principles Relative to the Establishment of Data Systems 19
- Requisite Conditions for a Comprehensive Multi-purpose Data System 24
- Summary of Achievement and Basic Conditions of Success 29
- General Implications 32
- Recommendations 36

2. A RATIONALE FOR IDENTIFYING AND DESCRIBING ACADEMIC/ACADEMIC-PROFESSIONAL PERSONNEL 38

- Summary 38
- Basic Divisions of University Manpower 39
- Academic/Academic-Professional Personnel 41
- Basic Personnel Data Items 44
- Operational Groupings of Personnel Data Items 49
- Competencies - A Special Set of Data 52
- Recommendations 58

3. THE FULL PROFESSIONAL LIFE: ITS PHILOSOPHY AND ITS DESCRIPTION THROUGH ACTIVITY CONCEPTS 61

Summary 61

Philosophy of the Full Professional Life 62

Criteria for the Development of Activity Categories 64

Exploration of New Activity Concepts 66

The Final List of Activities: Major Categories and Subcategories 73

Recommendations 88

4. ACTIVITIES MEASUREMENT DATA 90

Summary 90

"Effort" Versus "Time" as a Basis for Measurement 91

Relating Activities to Salary 95

Activities Measurement and Support from Federal Contracts and Grants 99

Uses of Data from Activities Reports 103

Activities Measurement in Computing Full-Time Equivalents 107

Recommendations 115

5. STUDENT DATA 117

Summary 117

The Centrality of Student Data 118

Previous Studies and Present Objectives 120

Uses of Student Data 121

Data and Reports 124

Procedure 126

Minimum Student Data Recommended by the Project 127

Minimum Student Data, AACRAO Handbook 130

Recommendations 142

6. FACILITIES DATA 143

Summary 143

Purposes of Space Inventory Data 144

Understanding the Building Space Inventory 146

Accomplishing the Building Space Inventory 149

Space Utilization Analyses: Need for Perspective 152

Measurement of Room Utilization 154

Types of Space Utilization Studies 159

Building Space Data and Equipment Data 160

Definition of Equipment 161

Equipment Inventory Objectives Reported by Institutions 164

Data Requirements and Inventory Objectives 166

Allocation of Equipment Costs 167

Elements of an Inventory Control System 171

Recommendations 176

7. FINANCIAL DATA CONCEPTS 178

Summary 178

Financial Data Relationships 179

Budgetary Reporting Compared with Activity Reporting 181

Budgetary Concept 183

Activity Concept 186

Relationship Concept 187

Potential of the Relationship Concept 191

Recommendations 193

8. THE ORGANIZATION OF INSTITUTIONAL DATA 194

Summary 194

Needs for Data 195

Problems of Data Organization 196

The Data Organization Chart: Its Purposes 201

Zone 4: Institutional Resources 203

Zone 3: Organizational Structure 208

Zones 1 and 2: Population Bank and Financial Bank 210

Recapitulation 213

Zone 5: Institutional Activities 213

Zone 6. Institutional Programs 218

Zones 7 and 8: Output and Characteristics 219

Combinations of Data 220

Uses of Institutional Data in Administration 221

Recommendations 231

9. TOTAL INFORMATION SYSTEMS FOR COLLEGES AND UNIVERSITIES 233

Summary 233

Overview of the Total Systems Concept 234

Elements of the Total Information System 237

Information and University Management 245

Developing Major Systems of Data 253

Operating Subsystems 257

Cost of the Total Information System 258

Establishing a Total Information System 259

Recommendations 261

PART II

SUPPLEMENTARY MATERIALS FOR USE IN MEASURING AND REPORTING COLLEGE AND UNIVERSITY RESOURCES AND ACTIVITIES

10. ACADEMIC/ACADEMIC-PROFESSIONAL PERSONNEL: SUPPLEMENTARY MATERIALS 263

  I. General 263

  II. Development of List of Maximum and Minimum Data 264

  III. Development of Specialty Lists 276

  IV. Guidelines for Constructing an Activities Index As a Method of Computing Full-Time Equivalents of Part-Time Personnel 293

11. FACILITIES DATA: BUILDING SPACE 297

  I. General 297

  II. Supplementary Materials on Accomplishing the Building Space Inventory (Exclusive of Inventory Forms) 297

  III. Forms and Instructions for the Inventory of Building Space 301

  IV. Supplementary Materials on Space Utilization Analyses 331

12. FACILITIES DATA: EQUIPMENT 334

  I. General 334

  II. Forms and Instructions for the Inventory of Fixed Equipment 334

  III. Supplementary Materials on Inventory Data Requirements and Objectives 350

  IV. Miscellaneous Methodologies 364

13. THE ORGANIZATION OF INSTITUTIONAL DATA: SUPPLEMENTARY MATERIALS 368

  I. General 368

  II. List of Institutional Activities 369

  III. Suggested Reports and Analyses 388

14. TOTAL INFORMATION SYSTEMS FOR COLLEGES AND UNIVERSITIES: SUPPLEMENTARY MATERIALS 403

I. General 403

II. Basic Data Files 403

III. Outline for an Information System for University Management 410

PART III

APPENDICES

A. List of Participants 417

B. References 421

C. Subject Index 432

CHARTS

1-1. Data Organization* 17

8-1. Data Organization** 202

8-2. Steps in Measuring and Reporting University Operations 227

11-1. Form Used for Inventory of Nonresidential Rooms 303

11-2. Form Used for Inventory of Residential Buildings 318

11-3. Form Used for Inventory of Nonresidential Buildings 322

12-1. Form Used for Fixed Equipment and Room Analysis 337

12-2. Form Used for Fixed Equipment and Room Analysis*** 346

---

*Abbreviated version.

**Detailed version.

***The form in Chart 12-2 is a continuation of the form in Chart 12-1.

PART I

COLLEGE AND UNIVERSITY RESOURCES AND ACTIVITIES

CHAPTER 1

A COMPREHENSIVE APPROACH TO DEVISING SYSTEMS OF REPORTING DATA ON UNIVERSITY ACTIVITIES

SUMMARY

This chapter reviews the total Project - the problem of increasing need for accurate, current data on the activities of colleges and universities, the comprehensive approach used during the investigation to define and describe a solution to this problem, and a perspective of the results achieved, as well as general implications suggested by the Project effort.

Also, this chapter probes into the changing role of the university in today's society and the uses of information systems in higher education; and it sets forth conditions requisite for the development and success of a comprehensive, multipurpose (or total) information system that would be broadly compatible among institutions.

Four general recommendations, briefly stated, are to the effect that (1) the analytic and philosophical view of higher education, as presented in this report, should be accepted as a basis for the development, on a national scale, of an open-ended, compatible total information system; (2) a permanent agency should undertake to implement the findings of the Project and coordinate future developmental work toward this kind of system; (3) pilot demonstrations in colleges and universities, encompassing the data areas covered by this report, should be initiated; and (4) recognition should be given to the fact that the information systems of all levels of education must be capable of being intermeshed, and that these systems should fit into the totality of the scientific community and other comparable communities since common data on these groups are needed for many purposes.

Problem

There is an increasing need, both for colleges and universities themselves and for many Federal and other agencies, to have up-to-the-minute, accurate, complex data, especially statistical, concerning the activities of colleges and universities. This need will continue to increase as the relationships of colleges and universities with the Federal Government and other agencies continue to grow more complex. The planning necessary for efficient Federal support of research and training, as well as the planning within and between universities themselves, demands more and more accurate information.

At the present time, however, the measuring, recording, and reporting of these data are in a state of confusion. University officials are flooded with questionnaires sent out independently by many different agencies; these questionnaires overlap, employ different terminologies and categories, and, in general, fit no pattern which may guide the university in the original preparation of basic data. The effort of the universities to handle the vast number of requests for data is further complicated by a lack of correspondence among the measuring and recording procedures and the cataloging of data by different agencies. Hence, the records now kept in colleges and universities are so established that officials at the institutions find it extremely difficult to furnish the National Science Foundation, and others, with accurate and comprehensive data describing the activities of their institutions. In many instances, the administrative officials of the universities, in filling out fiscal, facility, and manpower questionnaires, have had to resort to a variety of devices such as culling files and making crude estimates. These methods have been tedious, expensive and, in the end, largely unsatisfactory. In short, experience shows that more systematic and uniform mechanisms must be adopted if colleges and universities are to be able to record and report their activities accurately and completely with a reasonable expenditure of time and money.

Objectives

Therefore this study was designed to devise and test systems of measuring and reporting activities in colleges and universities so that such institutions would be enabled to maintain records adequate both for their own purposes and for reporting to the various agencies which stand in need of this sort of data. All fields of university activity - such as instruction, research, public service - were to be covered, involving data about manpower, students, facilities, and finances. In addition, the study was to cover all major components of the university, including liberal arts colleges, engineering schools, agricultural experiment stations, Federal contract research centers, medical schools, and university-owned teaching hospitals. It was hoped that the outcome of the study would be a greatly improved method of measuring, recording, and reporting which would remove the present intolerable burden from university administrators and yet provide both them and others with more complete and accurate data.

Although the Project was originally conceived as fluid in scope, broad, and open-ended, its many ramifications and its far-reaching potential were not really understood until considerable investigation had taken place. In many cases, prior basic problems were uncovered which needed solution before one could move toward ultimate objectives. This report describes these problems and the efforts, successful or otherwise, made by the Project Group to solve them. As the study was carried forward, fuller knowledge internally modified the Project so that, in one sense, it now reaches beyond its originally conceived specifics, and, in another sense, it has not carried out its total hoped-for program. It was found necessary to lay foundations in some areas where it had been hoped final solutions might be reached more quickly.

However, it is hoped that this report will present broad, though uneven, progress towards the goals originally specified. It was, of course, never anticipated that this study would be complete and final. On the contrary, it was recognized from the first, although the study itself has underlined the fact, that the development towards a total information system, as envisioned in the Project, must be a matter of continuous study and modification.

Uses of an Information System

From the beginning, the Project Group realized that a broad, comprehensive view of the problem of university data was necessary. With this viewpoint, it seems possible to group all the needs and uses of university data as follows: (1) There are the needs of the day-to-day operations of the university and of its various parts; (2) there is the general reporting which gives a description - at least quantitatively - of the "state" of the institution, or of education generally in a state or in a region or in the nation; and (3) there is the area of educational decision-making in its broadest and most inclusive reach, from the simple and rather immediate administrative decision within an institution, through the gamut of projection and planning, to the adoption of long-range national strategies for education.

Day-to-Day Operations

Until recently, there had developed in most institutions a number of different centers for the generation, collection, or storage of data.

These various offices were largely independent, and each office determined its own needs and procedures for collecting, classifying, and maintaining data. Thus, fairly independent informational systems emerged within institutions, and, as these became more complex and sophisticated, somewhat independent systems of data selection, definition and classification, storage, recovery, and use were developed. Thus, there evolved the system of the registrar, and the various systems of the deans and other distinct officials. In some areas, sophistication and standardization came more rapidly than in others, but, in almost all cases, they came independently. The business officers, for example, and the registrars, developed their systems in relative isolation not only from each other, but from other parts of the university as well.

For the most part, then, the development of systems to meet the day-to-day needs of universities, and the various parts of universities, has proceeded in a disorganized and disparate way. The result has been considerable confusion, overlapping, and even contradiction in final reporting. For example, in many institutions even now, the list of, say, the full-time members of the graduate faculty will vary, depending on which office of the university supplies the list. The same may be said with regard to the breakdown of students into full- and part-time, and many other items of information.

It is clear that any system of information must provide for day-to-day needs, and all of these sub-systems and individualized needs will have to be taken care of by a total system. A review of this area indicates that day-to-day information needs can be correlated and integrated only on the basis of a university-wide approach to the problem of information and data processing.

The "State" of Institutions of Higher Education

Certain basic kinds of reports have been requested from institutions for a long time by various government agencies and educational organizations. Here again, the agency in question, or the organization, has fairly much determined what kind of information should be reported - not, of course, without consultation with institutional representatives who are generally drawn from the offices or area from which the information is requested. Thus, the U. S. Office of Education has regularly requested information from registrars with regard to certain kinds of student data. This kind of data collection results in reports which are largely aggregations and averagings of reports received from the various institutions. These reports give a quantitative, and to a certain extent a qualitative, description of the educational activities in the nation. They contain, for example, how many Ph.D.s were conferred in various fields, how many students were going into the various kinds of professional schools, how many students were continuing through four years of college, and trends in the number of students going from high school to college.

This reporting has likewise been somewhat isolated in the sense that the information required for a statistical summary of students according to various definitions and classifications has largely been the work of the registrar's office, and has been taken care of rather independently from such financial reporting as a comptroller's or treasurer's office might make to another agency, and independently, for example, from the kind of reporting an alumni office may do for appropriate national organizations. Although the necessity of some kind of general agreement among registrars, for example, as to the basic definitions and categories for student data has long been recognized, the definitions and practically the whole system has largely been worked out by registrars with, indeed, external consultation at times. Thus, the American Association of Collegiate Registrars and Admissions Officers (AACRAO) in 1962 sponsored the publication of the Handbook of Data and Definitions in Higher Education.

Another case in point is financial reporting. The widely used two volumes on College and University Business Administration, published by the American Council on Education (Volume 1 in 1952 and Volume 2 in 1955), were compiled by the National Committee on the Preparation of a Manual on College and University Business Administration. Currently, these volumes are under revision by a committee which consists of business officers exclusively.

Here again, even where national standardization has been sought, it has been largely within a restricted area and carried out by persons interested in that area. Registrars have worked out definitions for their own purposes, and business officers have worked out categories most suitable from their standpoint. If these various systems are to be interrelated so that a total information system results, a comprehensive approach which will bring together, or interrelate, the persons, areas, and national systems, will be necessary. This overall system will have to be operative within each institution as well as on the national scene; otherwise, disparate stores of information handled in different ways will continue the impossibility of putting sufficient data together to obtain a total picture even within the university as a whole, and certainly within the nation as a whole.

Educational Decision-Making

This group of needs and uses of university data has become, by all odds, the most important. The whole enterprise of American education has become so vast, so complicated, and so important that its management and its planning can no longer follow a leisurely path of trial and error, or a slow development by intuitive and ad hoc decisions. A brief examination of the changing role of higher education in American society will show why this is so.

The next 15 years will be a period of enormous expansion in higher education. The simple fact of increased numbers of students alone sets of itself an enormous task for American institutions of higher learning. But it is not merely the increase in enrollments that sets the problems for colleges and universities. A radical change, unprecedented in all past history, is taking place in the relationship of the establishment of higher education to society as a whole, and to every segment of that society.

For the first time in history there is emerging in the United States a completely technological society. In such a society, the labor force made up of those who can offer only their physical strength, or rudimentary and routine skills, is steadily shrinking and will continue to shrink. However, in relation to the gross population and the gross national product of this society, the amount of research, the number of experts and the level of training of experts will continuously rise in geometric proportion. Even if there were no noteworthy population increase, this technological society would demand a vast expansion of higher education.

In addition, society, from an economic point of view, will depend more and more upon the universities, not only for educated and trained manpower, but for knowledge, research and development, for continuous creativity. In this context, it is not surprising that business and industry are recognizing their dependence on the colleges and universities and are working ever more closely with them. Higher education has become a most important economic input and institutions of higher learning have become a primary resource of business and industry.

Moreover, the relationship of government, especially the Federal government, to the university establishment of the nation, and the relationship of universities to government are of a new kind and of vast proportions. Universities have become a national resource, not only immediately related to the national welfare, to security and defense, to economic growth and prosperity, to general well-being, but also intimately and directly involved in the advisement of government at all levels and in the active formulation of national policies touching every phase of society and national life. In turn, the Federal government is providing and will undoubtedly continue to provide higher education with massive financial support. Although the cold war has obviously accentuated this situation, the governmental use of universities would steadily grow, even if the cold war were to disappear.

Furthermore, the society now emerging is fundamentally a society of abundance and leisure. Those things which in other societies have been the privilege of a small class - medical care, art, recreation, health, good living conditions - are becoming the possessions of all individuals. This, in turn, creates a demand for an enormous amount of research, many more experts, and whole new professions and kinds of experts.

For higher education, therefore, the present is not merely a period of numerical expansion; it is a period of fluid reorganization in the face of new and massive pressures, of new opportunities and new obligations. Colleges and universities are not simply called upon to provide education for more people than ever before; they are called upon to face a new, complex historical situation vigorously, imaginatively and creatively. New types of institutions, e.g., the "Multiversity," or the "University Center," will emerge. There will be a realignment of institutions, shifts of leadership, failures and closures, successful and spectacular developments. It seems likely that this period of reorganization may well set the patterns of internal relationships in American higher education for decades, and even for a century or more.

The new pressures, opportunities, and obligations highlight both the need and the difficulty of making intelligent decisions as part of educational statemanship, of long-range planning, and of the administration and efficient management of higher education at every level.

The preceding discussion is based on the conviction that the American economy can, should, and will support the educational effort the nation needs for the future. However, it is equally important that the educational establishment, faced as it is by a gigantic task, be conducted with the utmost economy and efficiency. Every dollar wasted, every dollar spent less wisely is a loss to the economy and to the quality of educational achievement. Efficient institutional, local, regional, and national management is essential.

Management implies planned directions and a measure of control. Planning implies intelligent decision-making and organizational structure to arrive at and carry out decisions.

The basic two needs thus emerge. The first is that decisions must be made intelligently, that is, by competent people on the basis of the best available information. The information usages dictated by modern managerial science must be employed in educational administration. From this standpoint, an adequate information system, as well as continuous institutional research, is necessary for university administration.

But it must be stressed that intelligent educational decisions must always take into account the nature of education and of educational institutions. Thus, one may rightly insist that efficient institutional planning should result in the provision of economical facilities and of the efficient use of these facilities. "Economy" and "efficiency," however, must be interpreted "educationally." Economical and efficient management should provide the best possible conditions for the academic staff and the students to carry on their appropriate activities. Management which simply transfers clerical tasks to instructors, or provides facilities which are easy to clean but impossible to teach in, or creates scheduling which records a high usage of space but destroys time and opportunity for faculty-student contacts would be neither economical nor efficient in a university. Universities must solve the problems of combining effective management with that free and flexible institutional environment necessary for the academic life. Hence, the second basic need is an organizational structure which will effectively combine all these factors.

In acting upon these needs, universities must somehow combine decisive administration with the professional integrity and freedom of the community of scholars. This last point underlines the fact - which will be frequently examined in this report - that an information system, to be fully adequate, must be worked out within the context of sound educational theory.

Consideration of the "information" needed for intelligent decision-making and planning requires distinction between the regular and routine collection, recording, storage, and reporting of fundamental data, and the special reports and studies in depth which are necessary from time to time or for special purposes. It is not necessary, or desirable, or possible, to plan and construct an on-going information system which could by simple manipulation of existing data produce all the special answers required in educational planning and academic decision-making. At least some special institutional research must be performed.

However, the system itself must be planned so as to subserve the needs of specialized institutional research insofar as possible. This means that the system must be comprehensive and basic, not dominated by limited objectives and not rigidly set by immediate purposes. The system must be potentially multipurpose.

The Project as a "Comprehensive" Approach to the Problem of Information

What, then, is to be understood by a comprehensive approach? Basically, it means that the Project Group took into consideration all data within the university and every operation of the university in which information was generated or needed, or ought to be generated. No area of information was seen as irrelevant to the total problem. Also, the entire structure of the university, all of its departments and schools, its offices, its services, had to be kept in view from the standpoint of a total information system. Just as no sort of data could be omitted from the over-all view of the Project, so no particular office within the university in which data were generated or used, or needed, or stored, could be overlooked.

Further, "comprehensive" here has reference also to the national scene. Since a solution is desired to the total national problem of university data, a procedure which systematically ignored one type or size of institution - for example, small liberal arts colleges - would be, obviously, an inadequate approach. Consequently, throughout the Project both the needs and resources of the full range of institutions constituting the establishment of higher education in the United States were kept in mind. At times, the problem was approached by preparing minimal and maximal lists of data items. Sometimes it was approached by preparing an indefinitely expandable list of items. Although the total drive of the Project was toward an interlacing system of machine data processing, with ultimate use of whatever would be at any given time the latest data processing equipment, it was kept in mind, nonetheless, that many institutions would not have machine data processing facilities immediately available either locally or cooperatively with other institutions. The Project, therefore, was not so tied into data processing equipment that this became a factual assumption necessary for the success and the carrying out of the basic plan proposed in this study. At all points, it remains possible to do the kind of thing that is here proposed on a much smaller scale, and to handle it by simple, clerical systems.

In reference to the national scene, the Project Group also kept in mind the information needs and uses of not only the universities and the supporting agencies but all the agencies of the government and those private organizations which need and collect data. In short, the over-all system aimed at in the Project was to include, as far as reasonable and possible, every foreseeable need for the use of information. Such a comprehensive approach, therefore, differs considerably from that of experts or officials operating within limited spheres of interest. In the broad, comprehensive view here taken, it would be necessary to relate every piece of data within the institution to every other piece. This meant, of course, that in developing such a system there would have to be representatives of all the different areas, either directly, or indirectly, within the working group.

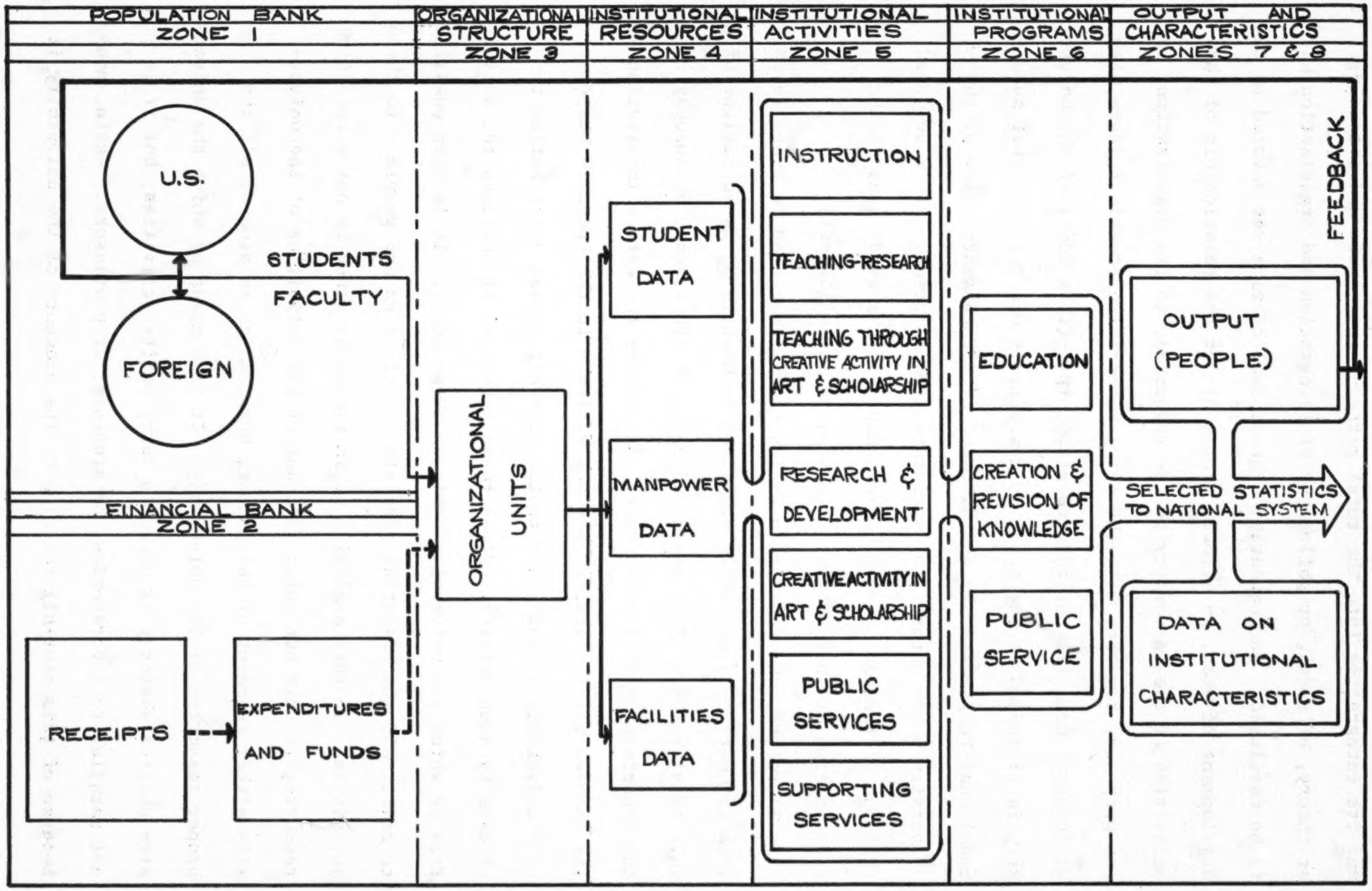
It was for this reason, therefore, that the Project Group consisted of institutions, and not of specific officials from the institutions or of specific offices. The effort was to involve through a few representatives the total staff of each institution. Hence, the institutional representatives who attended the plenary sessions, those who worked on various committees, as well as the back-up staff within each institution, represented a crosssection of offices and operations within the institutions, and brought together representatives of many different segments of the universities. Although this fact was one of the basic strengths of the study, it was a very great initial handicap.

As in the academic disciplines themselves, specialized workers and officials in a given administrative field talk best when they talk to one another. Registrars speak to registrars with greater ease, fluency, and understanding than is possible for them when they speak to specialists in other areas. Comptrollers and business officials meeting together immediately are in rapport. They speak the same language, they have the same philosophy, they have the same problems. They have, indeed, the same prejudices, antagonisms and misunderstandings. And so, when representatives of all of these were brought together to consider a problem which touched all of their operations most intimately, not only within the institution but on the state and national level, a very grave problem in communication and understanding resulted. Therefore, much time during the early stages of the Project was devoted to reaching a working base of mutual understanding.

Thus, it became emphatically evident that the problem of the Project was not merely to bring together existing bodies of data and interrelate them. The solution had to be much more fundamental. Before any final decision could be made with regard to the data in any one area and its integration into the total pattern, some basic understanding, or theory, or model, or philosophy of integration and organization had to be developed. Consequently, a great deal of time was devoted to the development of what, in effect, is a model of the relationship of the activities of the university to its resources, to its organization, to its purposes, together with the total integration of this pattern with an informational flow or interrelationship. (This model of the university is presented in Chapter 8.) However, it was realized that such a model must be governed by and dictated by a fundamental view of the university - its nature, its structure, its purposes. It is believed that one of the basic contributions made by this study lies in the presentation of just such a basic view of the university.

Therefore, the Data Organization chart (presented in abbreviated form in Chart 1-1, and fully described in Chapter 8) is an outline of this total report. From one standpoint, it expresses a philosophy of the organization of a university. It relates the entire institution - its people, its facilities, its activities - to the specific purposes of a university as such, and to the over-all social contribution to be made by a university. Given these purposes, it outlines the activities by which the university achieves these goals. It is then possible to relate all the essential elements - facilities and people - to these activities. In this analysis, it is seen that money is not a specific resource; it does not enter into any of the activities of the university either as agent or instrument, but remains related to all the proper resources of the university. It is a means by which the university obtains whatever it needs to carry on its activities, but it is not parallel to laboratories, or students, or professors. Again, money, because of this over-all relation to the elements of the university, is

Chart 1-1. Data Organization


POPULATION BANK
ZONE 1
ORGANIZATIONAL STRUCTURE
ZONE 3
INSTITUTIONAL RESOURCES
ZONE 4
INSTITUTIONAL ACTIVITIES
ZONE 5
INSTITUTIONAL PROGRAMS
ZONE 6
OUTPUT AND CHARACTERISTICS
ZONES 7 & 8
U.S.
FOREIGN
STUDENTS
FACULTY
FINANCIAL BANK
ZONE 2
RECEIPTS
EXPENDITURES AND FUNDS
ORGANIZATIONAL UNITS
STUDENT DATA
MANPOWER DATA
FACILITIES DATA
INSTRUCTION
TEACHING-RESEARCH
TEACHING THROUGH CREATIVE ACTIVITY IN ART & SCHOLARSHIP
RESEARCH & DEVELOPMENT
CREATIVE ACTIVITY IN ART & SCHOLARSHIP
PUBLIC SERVICES
SUPPORTING SERVICES
EDUCATION
CREATION & REVISION OF KNOWLEDGE
PUBLIC SERVICE
OUTPUT (PEOPLE)
SELECTED STATISTICS TO NATIONAL SYSTEM
DATA ON INSTITUTIONAL CHARACTERISTICS
FEEDBACK

one sort of general measure and one point of integration. Hence, financial matters have a separate area on the chart.

Out of this same consideration came the identification of areas of study which would necessarily form part of a comprehensive approach to the problem. A natural division of data into academic, professional and other personnel data; student data; and facilities data was recognized as covering the basic elements of the university. Other areas of study included a consideration of fiscal data as a special problem, and, finally, there was the problem of organizing the total data system, together with the technical difficulties in so doing.

Relationship of the Project to Previous Studies and Existing Systems

As indicated previously, activities dealing with the development of systems of definitions and classification for various areas of university data have been going on for a long time. In most cases, these activities have been carried on with some degree of isolation and for limited purposes. As the Project not only assumed a comprehensive approach to the entire problem, but also proposed to take a fresh look at the whole university situation, should it ignore these previous partial systems?

The Project Group concluded it would be neither practical nor wise to ignore those areas in which systems already existed. It was decided, therefore, that every effort would be made to investigate whatever had already been done, and, where possible, to incorporate it into the total picture which, hopefully, was to emerge from this work.

There were, for example, the two volumes on College and University Business Administration, already mentioned as being under revision. Since it was realized that there would be no point in reconstructing a manual of this sort for university accounting offices, attention was given to the intervening steps which could relate the results of the accounting practices and principles in the existing volumes to the kinds of fiscal data required to complete the total pattern of information to be covered in this study.

Another area in which considerable sophistication and a considerable degree of uniformity had been achieved was that of student data. After the present investigation was initiated, the Handbook of Data and Definitions in Higher Education (AACRAO, 1962) was published, and the Project Group undertook a study of the new publication to determine to what extent it could be integrated into the total information pattern being developed in the Project. As a later chapter indicates, there remain some open problems, but it is hoped that this total report will provide a basis of philosophy and of procedure by which the desired integration can be achieved.

No such standardization had been achieved in the other areas of university data but, wherever materials already existed, they were adapted as far as possible and incorporated into the total study.

General Principles Relative to the Establishment of Data Systems

The organization of knowledge, whether it be in the sciences and other scholarly disciplines or in the management of practical affairs, presupposes and is made possible by a system of definitions and classifications, a system of categories. Once such a system is set up, it fairly well determines both the effectiveness and the limitations of a given organization of knowledge. Hence, the establishment of basic categories is a matter of primary importance.

The first principle which governs the construction of definitions and classifications is that these must relate in some fashion to the things they purport to categorize or classify. There may be situations in which it is possible to have a categorical concept which properly presents within intelligence the characteristics and traits of objects as they actually exist, really are, and are given in experience. For the most part, however, the categories and classifications used in dealing either with the world of nature or the world man has created are not simply imposed by the nature of things or of men. In many cases, the objects to be classified fall along a spectrum on which it is impossible to draw exact dividing lines. Thus, in the naming of colors, for example, many discernible shades are ignored. In other cases, the objects being dealt with display such a variety of characteristics that a selection must be made in view of the purpose of the classification and with due consideration for economy and manageability. The history of plant taxonomy offers excellent illustrations. Perhaps a simpler example is afforded by the arrangement of books. A library organized for the use of students will classify according to subject matter. A library, exhibiting the history of printing and bookmaking, will be arranged according to chronology, countries, and schools. For each of these arrangements, a selection relevant to the purpose of classification has to be made. Not only must the categories relate to the objects as they are, but they must be constructed of elements which are relevant to the purpose.

In brief, there is an element of human ingenuity and human purposefulness, as well as of the arbitrary, involved in most systems of categories and classifications.

However, no matter how arbitrary in the last analysis a final detailed classification might be, or however much the categories and definitions may be dictated by considerations beyond the simple natures of the objects to which they refer, the definitions and categories used must take into account the real nature of the objects insofar as this can be ascertained and certainly should not misrepresent the objects dealt with, or present them in some way which contradicts their basic nature.

Since the success of the Project hinges so much on the development of a viable set of categories, it is now clear why it was found necessary to make a thorough examination of the nature of the university (or college) as such and to attempt to understand the essential purposes of the university and the nature of the functions and activities which constitute its life. For this reason the Data Organization chart is not merely a schematic presentation of data flow or a diagrammatic description of the interrelationship between the elements of a university. It is all this, but it also presents a philosophical understanding of a university. The content of Zone 5 is an effort to list and describe adequately the activities of a university as they actually are performed. This listing is limited to the life of the university as such by its essential relationship to the broad purposes (Zone 6), the outputs (Zone 7), and the characteristics (Zone 8) of the university. By setting up this objective presentation of the university, two things are accomplished. First, there is established a controlling relationship to the given reality of university activity. Second, the relevance of the data and its description are controlled by the relationship to the essential purposes of the university (including its contribution to society-at-large).

For this same reason, a great deal of time and thought went into the analysis of the human agents of university achievement. Again, the twofold criterion of objective reality and of relevance was used so that the resulting list of activities for academic and professional persons (Chapter 3) relates intrinsically to the activities and purposes outlined in the Data Organization chart.

This same point can be approached in a different way. Any questionnaire or reporting form incorporates a set of categories, of definitions and classifications. In line with the previous discussion, this means that any questionnaire implies assumptions about (a) what the matters are that are being dealt with and (b) what about these matters is relevant to the purpose of the questionnaire. Hence, any set of survey questions embodies, consciously or unconsciously, a philosophical view and, by so doing, imposes that view on the data and on the results of the survey.

Moreover, questionnaires and surveys employing ad hoc categories which are not based on a carefully worked out philosophy of higher education have a potential danger. If academic people adapt themselves over and over to such categories - for example, in reporting the amount of time or effort they devote to their activities - they will themselves begin to think in these categories. The imposition and acceptance of such categories will simultaneously be the imposition and acceptance of a philosophy.

Unfortunately, this danger is not always recognized, and it is frequently thought that to solve pressing immediate problems, ad hoc definitions and categories can be created without basing them on fundamental assumptions. It is the conviction of the majority of the individual participants in the Project Group that this cannot be done. If a comprehensive approach to data looks towards not only a total system within each institution but a national system of systems which would call for compatibility between institution and institution, then the danger of imposing upon the whole system of higher education a philosophical view of the nature of these institutions through the informational system becomes very great indeed.

This refers back to an earlier point and emphasizes again (a) the logical priority of establishing a philosophy of higher education to the determination of categories, definitions and classifications, and (b) the practical necessity of constantly checking the construction of categories against the concrete reality of university life.

There is also a practical conclusion. If the Project succeeds at all, two things might emerge. First, a sound conception of the university might be set forth in terms of its specific purposes and functions and of its personnel and their activities. If this turns out to be basic enough and realistic enough, it might obtain rather widespread acceptance. Second, American institutions might move towards the establishment of internal total information systems which would be broadly compatible as between institutions. If and when these results follow, then universities would be in a position to insist that questionnaires and surveys be based upon this philosophy and the system of information files already existing within institutions. It is believed that if the classifications and itemizations recommended in this report, or projected to be devised in accordance with the basic principles of this report, are accepted, the universities will have on file, subject to manipulation, the fundamental data "unit-blocks" necessary to describe themselves and their operations. The system will, of course, have to be open to development since there will be changes in the operations themselves.

To return to the main point, it is clear that any organization of knowledge through categories must relate: (a) to the nature of the thing known, which includes both its constitution and its essential purposes (in the present case, we must base the categories on the nature of the university, its intrinsic and social purposes and on the nature of the academic life); and, (b) to the purpose for which the knowledge is being organized.

This latter point raises additional problems. In a single piece of institutional research or in a single survey, a single purpose or group of purposes can be identified. The categories used and the method of collecting and manipulating data can be clearly determined in view of this purpose. In the case of a comprehensive data system, however, identifiable purposes are multiple and broad, while the system should also be able to serve purposes not yet discernible, or, at least not yet clearly defined. By definition, the comprehensive system here envisioned must be, both actually and potentially, a multipurpose system.

Requisite Conditions for a Comprehensive Multipurpose Data System

Simple Information Units

Information has the highest potential for manipulation when it exists in the simplest units, when the information items are prime and basic.

A previous report describes and illustrates the concept of prime data as follows:

> . . . a college faculty member's rank (instructor, assistant professor, etc.) is a prime or basic item; his contract salary (for the regular session of 9-10 months - before deductions for taxes, retirement annuity, etc.) is similarly prime or basic; but the number of faculty members with rank of professor and contract salary between $8,000 and $8,500

> is a complex or derived item - obtained by cross-classifying rank against salary, and making a count of the number of cases fulfilling a double condition involving both rank and salary. Another example: the number of "volumes" in a college library is generally a matter of record (although the definition of a "volume" is not quite so obvious as one might suppose); similarly, the number of degree-credit students enrolling in the regular session (excluding extension, summer session, adult education, etc.) is also generally a matter of record; both of these might possibly be considered as "functionally" prime (even though formally complex). If, now, a questionnaire asks for the "number of volumes per regular-session degree-credit student," the answer given - obtained by dividing the number of volumes by number of students - is, in our terms, a derived or complex figure. (Observe, in passing, that if we are given this one figure only, we have no way of verifying from the data whether the respondent interpreted the term "volumes" or "regular-session degree-credit student" correctly: since the respondent did not supply figures for either of these entities.) In general, a complex or derived item calls on the respondent to make some cross-classification, some computation, some combination of different groups, etc. A prime or basic item is typically elemental, is commonly a matter of routine record, and does not involve cross-classification, combining of groups, or computation.[1]

For single purpose surveys, basic definitions may be devised which are in reality complex (consisting of clusters of data) or derived (consisting of ratios or relationships between prime units), but this limits the usefulness of the data for other purposes. The unity of a complex data "bundle" defies analysis as there is no clue to the relative roles of the components. The parts cannot be separated out for use in new and different combinations. Thus, if students are initially classified as in-state or out-of-state, this may serve to determine the tuition rate, but this information could not be used to distribute the students by counties within the state. If, however, the initial information is simply the home residence of the student, both these purposes (and others) could be served.

---

[1] A Proposal for a National Cooperative Survey of Education. Washington, D.C.: U.S. Department of Health, Education, and Welfare, Office of Education (October 14, 1960), pp. 17-18. (Manuscript.)

Prime or basic data are the irreducible and simple atoms of information. As in nature, simple information units are limited in number and yet can give rise to an indefinite series of compounds. Being simple and limited in number, they increase basic economy at the point of origination and are more easily standardized. If the original store of information consists of an adequate number of such "atoms," many new questions may be answered as they arise, without a return to the source of information.

An Adequate Body of Information

The total amount of information (the summation of the simple units collected) must constitute a reasonably adequate picture of the university. Given reasonably complete information about students, faculty, curricula, facilities, in the form of easily handled units, the potential exists for constructing answers to an enormous number of complex questions. Throughout this report, an effort has been made by a combination of analytical and empirical methods to establish a minimal but adequate data list in each area.

A Single Unified System

In order to have the highest potential for manipulation, all the units of data must be bound together into a single system within the institution. This does not mean, of course, that the information would be collected by one office only, or used by one office only, but rather that the various "files" (whether primarily fiscal, student, faculty, or facilities data) must be brought into a fundamental interrelationship, so that all stored institutional data would be available for common use and analysis. From this standpoint, there could be no such thing as a data file which is the isolated and exclusive possession of one part of the university. However the matter may be handled in different institutions, some central administrative supervision would be needed to insure the integration of all information systems, the elimination of duplication and overlapping, and the establishment of a university-wide flow of needed data.

Comprehensive Compatibility

In order to develop a common comprehensive data system, the categories to be used within the various parts of the system must be compatible either in the sense that a single common definition is used for any one piece of data, or in the sense that different definitions are so constructed that they can be brought into relationship within the same system. As various files developed independently in the past, incompatible definitions were elaborated which often blocked any pooling of data. These differences are sometimes merely accidental and can easily be adjusted, but often they arise from a difference of purpose. The case is then much more difficult. The purpose of information reporting is one of the intrinsic determinants not only of the items to be selected for reporting, but also of the definitions and classifications used. Where such a conflict of purpose exists, harmony can be brought about in one of several ways. With regard to the list of items, a common basic list, including needed items and excluding duplications, can be developed. This report has identified or developed such composite lists for each of the main areas of information. With regard to definitions, compatibility can be achieved in a variety of ways. If the difference lies in different combinations of items, compatibility can be reached by reduction to the simple elements of the combination. Otherwise, an adjustment of the category to serve the several purposes simultaneously may be necessary. Throughout this report, a constant effort has been made to bring all the areas of university data into such a compatible relationship.

From the standpoint of the larger hopes of this study, compatibility within institutions only will be wholly inadequate. A basic system must be proposed which at least could be accepted by all institutions of whatever size, type, or complexity. This purpose was kept in mind as the proposed categories were developed within this study. It is hoped that at least a foundation for such a universal compatibility has been laid down.

Feasibility

Finally, practical considerations limit the kinds of systems that can be developed. It would be possible to devise a blueprint for a system so complex and so costly that no institution or even group of institutions could manage it or afford it. Most of the proposals in this report have had trial runs at one or more institutions partly, at least, to test cost and to discover practical problems. In some cases, additional demonstration projects on various scales will be required. The study has attempted to devise a system which could be used in a simplified and inexpensive form but could, while preserving compatibility, be expanded according to the needs and resources of different institutions or consortia of institutions.

Summary of Achievement and Basic Conditions of Success

From one point of view, the Project was concerned, to a large extent, with the clarification of objectives and the definition of a genuine solution to the set of problems which were the reason for its initiation. This report does describe such a solution, namely, the concept of a total information system which would be broadly compatible between institutions; however, it does so without working out every detail.

Also, in the beginning it was not known whether the solution envisioned or any other solution to the problems would be really feasible. The multiple analyses and the varied pilot projects carried on in the course of the investigation have shown that a solution is possible. In establishing the possibility of the solution and detailing the conditions of that possibility, the Project simultaneously moved toward it.

The conditions basic to the success of the solution described in this report follow.

1. An Analytic and Philosophical View of Higher Education. The first condition which will be seen throughout this report concerns an analytic and philosophical view of the establishment of higher education in the United States and particularly of the college and the university as such. Any system of data collection, any information system, must rest upon a sound analysis of the subject matter with which it deals. It is believed that in the development of the view of a university and of its faculty, which is incorporated in this report, a definite basis is established to guide the development of an over-all system appropriate to the educational establishment and to the university world. A great many problems in the past appear to have resulted from the imposition on the university of systems which were not designed to fit the kind of thing the university is and which necessarily dis-

torted the final description of its activities. It is believed, therefore, that any progress towards the solution envisioned in this Project must rest upon the acceptance of a sound view of the nature of the university. It is further believed that the main lines of this view of the university, particularly as it touches an information system, are laid down in this report.

2. Basic Compatibility of Data Systems. The second condition involves a number of basic principles that have been developed with regard to the elaboration of a total information system which will serve all the purposes originally envisioned. It is clear that this Project shall fall far short of its objectives, precisely to the extent to which divergent systems or incompatible systems are developed at different institutions in different areas of information or in different regions throughout the country. For the total information system concept to succeed, there must be an agreement with regard to basic, standardized, comparable, and compatible data systems, and this compatibility must involve a built-in interrelationship between all the areas of data. This, of course, comes back to the basic problem of the organization of data by way of definitions, classifications, categories, and so on. It is clear that there is no absolutely right way to classify personnel or to describe space or to organize student data. When any of these things are brought to a final procedural system, there remain many choices. Some of these may be equally effective; some of them vary in advantages and disadvantages; and some of them are undesirable. Consequently, there is a point at which the acceptance of the final operational system is somewhat arbitrary. It is necessary, therefore, that these decisions be made in a universally compatible way.

This is not to say that a rigid, straight-jacket sort of system determined to the last detail must be imposed upon every institution and every area of institutional data. On the contrary, what is desirable is a basic open-ended system - a system which will permit either reduction or elaboration, without violating the basic compatibility of the system itself, and one which can be set up in a simple as well as a highly sophisticated way, as determined by the resources and the needs of each institution.

A national system, therefore, cannot succeed unless it rests upon a nationally accepted, basic set of categories and classifications with regard to a nationally accepted list of prime data.

It is believed that, in the main, this report presents such an open-ended system which can be refined, elaborated, or reduced to fit a wide range of institutional resources and institutional needs and which can become a common base for compatibility. No claim is made that some other terminology, or some other divisions of data, could not serve and perhaps serve equally as well.

3. Coordination of System Development. The third condition is that if and when such a national core of data were agreed upon and accepted, it would still be subject to a great deal of development. It would be important that this development not take place in isolated pockets around the country or in individual institutions. Whatever development takes place should be coordinated so that the systems would not, in time, diversify to the extent that they would lose their original compatibility and destroy the ultimate purpose of a total information system of this sort. It would appear, therefore, that ultimate progress will require some organized method of coordinating the development of the systems and providing for their systematic refinement and redevelopment in the future.

The Project itself was possible only because the group included representatives of all the different areas of interest within the university world. It is stressed that any continuous effort to coordinate future development should involve such representatives. Indeed, some agency or group of agencies should undertake to continue the exploration of the possibilities of such a project and, if possible, to establish a coordinated development throughout the nation towards a single but flexible compatible system. It is believed that a small full-time staff should be involved in this project and that it should be assisted by a group of consultants drawn from the university world and representative of all the different areas and facets of university information systems. Although there are details, sometimes very important details, which are still controversial and which will require additional study, this fact should not prevent an effort to develop the main conclusion of this Project towards the next intermediate goals. One of the immediate steps that should be taken is a series of pilot demonstrations in different types of units - in small colleges, in a large university, in a university system. These demonstrations should be coordinated and brought into final harmony, possibly through the activity of the permanent agency just suggested.

General Implications

This report and, even more, the experience of the total Project suggest certain implications which perhaps go beyond even the broad subject matter of the Project. It may be well to point out a few of these implications.

1. Generalization of "Comprehensive" Approach. Based upon a comprehensive investigation, the Project has produced a report which in-

cludes (a) an overview of the operational patterns of institutions of higher education, (b) newly developed, tested working procedures for selected operations and (c) guidelines for the development and application of integrative data procedures which have been conceptualized within the Project effort. Prior to the Project, these matters had been treated only in occasional and unrelated documents, such as bulletins from the U. S. Office of Education, the American Council on Education, and university offices of institutional research; histories of higher education; and scattered volumes, mostly informal, on the administration of higher education.

A general implication of the investigation itself, together with this report, is that the comprehensive attack on administrative problems of higher education, rather than the more usual piecemeal approach, is not only possible but promising and warrants further application.

2. Need for Institutional Self-analysis. As the Project investigators attacked new problem areas in data procedures, they found themselves constantly raising the questions: "Why?" "To what purpose?" Collecting and systematizing data without specified purpose would be unwise and perhaps impossible. It is clear that the determination of a data system depends on a prior determination of educational objectives. An institution cannot rationally set up an information flow system or decide on the size and complexity of its reporting system except in relation to its use. Yet, when investigators in the Project interviewed administrators at various institutions, it was found that they were often interested only in immediately needed ad hoc data and had only vague ideas of the genuine need for data or of the possible uses of data.

Thus, a clear implication of the Project effort is that institutions should formulate their educational objectives and analyze their operations and use of resources in the light of their objectives. It is on this basis that they should justify the collection and systematization of data.

What is said here applies also to educational systems and groups and, indeed, to the entire educational establishment of the United States viewed as an organic whole.

3. Evaluation of Educational Effectiveness. A basic resource of higher education is students and these same students are a basic resource of society. Hence, the value of a university to society lies in great measure in the kind of students it graduates and, ultimately, in the contribution which these graduates make to society.

The effectiveness of a university cannot be equated with a struggle to obtain a favorable balance on a profit and loss statement, as in business and industry. "Profit" and "loss" in education must be measured (if it can be) in terms of the students, in terms indeed of future generations and of society as a whole. Individual institutions can evaluate themselves only in the long view and in the comparison, for example, of post-graduation achievement with pre-graduation potential and specific education. In most cases, cumulative data, specifically selected for this purpose and continuously maintained over a long period of time and in comparable form, do not exist.

The guidelines laid down in this report may make possible the establishment of a body of evidence for evaluation of educational effectiveness over a long period of time, but such use must be consciously and wisely planned for.

4. Impact on Organizational Relationships and Structure. Much of

the Project was concerned with communication of data between man and man, between men and machines, and between institutions and other groups in society. It was found (a) that systematic communication and regular channels of communication were frequently lacking within institutions and (b) that in many institutions communication channels are not the same as organizational structure.

The Project findings indicate that, when the problem of intra-university communication of data is attacked in accordance with the guidelines of this report, communication of data will take channels that are more horizontal than presently found in most universities. Since organizational structure is intimately connected with information flow, the setting up of a complex information system may have a slow but significant effect on the organizational pattern of the institution. Clearly implied here is a need for formal analytical study of university structure from the standpoint of data communication.

5. Generalization of the Dual Perspective of this Project. An underlying dual concept in the Project was to the effect that any philosophy of the modern university must be infused with such wisdom as is within the capability of man, and that practical but advanced procedures must be found to assist the realization of philosophical purpose. In general, the Project investigators insisted that these two dimensions must be maintained simultaneously, and kept, as it were, in the same picture. This particular conceptual duality creates, to be sure, a precarious balance, but it also provides stimulus towards innovation, crosschecked by constant efforts to find practical solutions. There is a fruitful interaction between philosophical exploration of purposes and ideals and the search for methodologies to achieve and test them. It is modestly hoped that the Project, as herein reported,

displays this conceptual duality and illustrates its methodological value. If it does, other investigators might find it profitable to pursue dually oriented studies in other problem areas of higher education.

Recommendations

Although specific recommendations are included in the remaining chapters of Part I, four general recommendations, based on the over-all results of this investigation, are given below.

It is recommended:

1. That the analytic and philosophical view of higher education and particularly of the college and university, as presented in this report, be accepted as a basis for the development, on a national scale, of a comprehensive, multipurpose, compatible, open-ended information system.
2. That a permanent agency undertake to implement the findings of this Project and to explore the possibilities of further development of the total information system concept. Concurrently, this agency should undertake to coordinate the separate data systems that may be under development in various data areas, this coordination being directed towards a simple but flexible and compatible total information system. In so doing, this agency should facilitate continuing communication and consultation between whatever individual and group projects are now under way.
3. That a series of pilot demonstrations in various types of colleges and universities be initiated. These demonstrations should encompass the specific data areas covered by this re-

port. The permanent agency, mentioned above, might coordinate and bring into harmony these various pilot demonstrations.

4. That recognition be given to the fact that the information systems of higher education and of other levels of education must be capable of being intermeshed. Likewise, these systems should fit into the totality of the scientific community and of other comparable communities - common data about these groups being needed for many purposes - so that the national interest may thereby be served.

CHAPTER 2

A RATIONALE FOR IDENTIFYING AND DESCRIBING ACADEMIC/ACADEMIC-PROFESSIONAL PERSONNEL

SUMMARY

The first task faced in this chapter is the identification of that group of persons within the university who are primarily and directly concerned with the carrying out of the purposes proper to and distinctive of the university as such. This group is called "academic/academic-professional personnel," not with any intent that this term should be accepted into general usage, but only to identify the group without implying any relationship to previous terminology or classification.

Next, an effort is made to identify the basic or "prime" data items applicable to academic/academic-professional personnel. The sets of data so identified are organized in such a way as to provide a common base for standardized comparability within and between institutions and yet to allow for reduction or expansion, as locally required or desired.

The need for accurate descriptions of the full potential of academic/academic-professional people is discussed, and specialty lists are offered as a tool in creating individual profiles of competencies and specialties.

The organization of personnel data within the university is also explored, with recommendations that data on academic/academic-professional people be the responsibility of a single central authority, that the collection and dissemination of data be accomplished through an automatic internal flow system, that provision for updating be made, and that data be stored in a manner that will permit manifold combinations. Other recommendations include additional study and development of the list of personnel data items, further testing of the specialty lists, and special studies of the development of "derived" data.

A university consists essentially of a group of people formed into a community by the pursuit of common goals. In the Data Organization chart, these goals have been identified as Education, Creation and Revision of Knowledge, and Public Service.

Education includes, but is not limited to, the transmission of knowledge, the formation of intelligence, and the nurture of men of leadership, as well as a kind of guided maturation. This goal, of course, implies the presence of students who have joined the university community to take advantage of these educational benefits. The staff of the university are the active agents of the community both in bringing about changes in students and in working toward other goals.

The creation and revision of knowledge can be carried out only within the human mind and only by human beings. Today, knowledge is sometimes spoken of as though it were a commodity that can be "produced," "stored," and "retrieved." However, knowing is an activity of human minds, and knowledge, as such, is not properly "stored" even in libraries or computers. The intellectual activity of a community of scholars keeps knowledge alive and growing. Students participate in this life of knowledge both as learners and, to less extent, as creators, but primarily the academic staff carries out university programs of teaching and research.

Finally, the public service of a university is service rendered to human beings and to human groups by human beings. It does not consist in the production of commodities or the provision of material benefits. It is a goal to which the entire university community contributes.

Basic Divisions of University Manpower

Since the people who constitute the university community are central to its activities, they are also central to the whole body of university data. In approaching the problem of how to classify these people, two groups can be clearly defined. There are those who are at the university to be educated, to be formed and informed: the students; and there are those who are active agents in carrying out all the purposes of the institution: the personnel of the university. Admittedly, these groups may occasionally overlap, since the same individual may be both student and instructor. However, the student group usually can be easily identified, and a later chapter deals with the systematization of student data.

With regard to the remaining group - namely, those people who are identified with the university as actively carrying out its purposes - fundamental difficulties are encountered in trying to set up a common, central personnel data file, as was once considered desirable early in the study. An institution has such widely varying information requirements - for example, data about professors versus data about janitors - that a common information file would seem to have no significant unity. Moreover, management and organizational structures of universities appear to demand a basic division of personnel, policy, and records.

Therefore, all non-student personnel have been divided as follows: (1) those who are directly concerned with the specific and proper activities of a university; and (2) those who carry on other activities in support of those activities serving the purposes of a university as such.

The first category is designated as "Academic/Academic-Professional Personnel." These people include all those directly involved in the teaching, research, and student or student development activities of the university, or in the direct administration and management of these activities. A manpower data file would be established for this category of personnel.

All other personnel, e.g. clerical and janitorial, are considered to be in support of the activities which are immediately involved in the pursuit of the goals of the university. Data concerning personnel in this second category would differ in amount and kind from the data required for those in the first category. Thus, janitors or bookkeepers would not be asked about such matters as membership in learned societies, publications, or outside consulting. It is assumed that a second manpower data file would be established for this category, and that such information as may be necessary for the purposes of a total information flow system could be recovered from this point through compatible coding and other devices. Although two different centers of personnel information would be thus established, compatibility could easily be maintained between common basic information items.

It is the first category that became the focus of the manpower part of this study, and it is to this kind of university person that the remainder of the discussion on manpower refers.

Academic/Academic-Professional Personnel

The designation, "Academic/Academic-Professional Personnel," is meant only to be roughly descriptive of a category of personnel for whom faculty and non-faculty titles, ranks, or other classifications are inadequate because they do not cover the total membership of this group. Although it is not suggested that this designation be adopted as a standard title for this category, the term does seem sufficiently expressive as to facilitate discussion about this kind of university person.

This category includes faculty, officially and formally so designated; non-faculty academic personnel; and academic-professional personnel.

There appears to be no need to work toward a uniform definition of faculty, or to attempt to translate the faculty categories used by different institutions into a uniform and common vocabulary. While there are differences of terminology, of criteria, of rights and duties as between institutions, faculties are, in general, identifiable and roughly equivalent. The use here of the term "faculty" implies acceptance of whatever the title designations and the criteria are at each institution. Professional librarians (whether or not a particular institution grants them faculty status, titles, and/or rank) and academic administrators are included. All such persons fall under the "academic" part of the over-all designation.

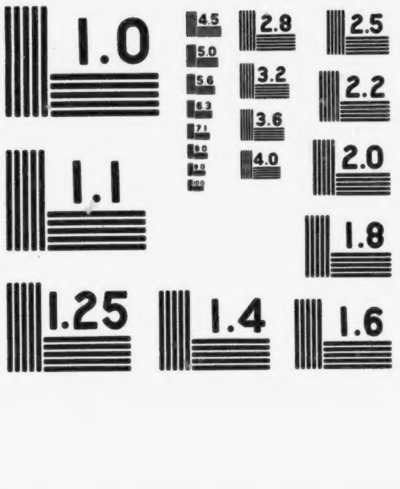
In addition to faculty, there are persons with varying titles and responsibilities who, nonetheless, are directly involved in the teaching, research, or student development activities of the institution. There are senior research people, who, in some institutions, are not given faculty rank. Also, there are student counselors who are directly involved in student development and who may hold no faculty appointment or rank. There are post-doctoral fellows who may be teaching or doing research; there are graduate fellows; there may be undergraduate seniors acting as laboratory assistants. There may be an expert within the computer center who has no faculty rank but who is a principal investigator on a research grant. In the offices of supporting services, there are persons who would qualify as academic personnel, except for their titles and tasks, and who are significant personnel resources. All such non-faculty personnel are also considered to be "academic."

Another group within the over-all category can be labeled "academic-professionals." This group consists of persons who are not directly and actively engaged in the activities mentioned previously, but who stand in immediate supporting roles with reference to those activities. It is granted that this group is difficult to define in relation to other supporting personnel. It is felt that this group will have to be worked out almost on an individual basis, but the allocation of persons to this group must be made by the people who are being immediately supported. It is likewise admitted that there may be an overlap because of personnel classifications within the institution, so that information on the same person may be kept in two different places. It is believed, however, that this overlap will be minimal and will have only minor significance. Here, for example, would be an electronic technician who may be involved in a research team, say, in a department of physiology, or a machinist who does not simply carry out specified directions for handling equipment but who may be creatively engaged in cooperatively producing new equipment necessary to carry out a research project. Routine supporting personnel are not included.

Neither the over-all designation nor the three-fold division is intended to create titles or operational classifications for university reporting. They are here used as a descriptive way of identifying those persons within the university who should be placed in this general category of personnel. The information system of the institution should be unified

2 OF 7

ED 016309


1.0
4.5
5.0
5.6
6.3
7.1
8.0
9.0
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.1
1.8
1.25
1.4
1.6

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963

and systematically compatible for this total group of academic/academic-professional persons.

Thus, for any group of academic/academic-professional personnel, or comprehensively for the institution, the university should be able to obtain whatever information is desired, despite variations in appointment and title designations. For example, if one wished to find all those who are competent in high energy physics, can speak Spanish, and are able to teach mathematics, all these could be found, even though some might be ranked as professors, others appointed to post-doctorals, and others designated as research associates.

Basic Personnel Data Items

Now that the category of personnel under study has been defined, what sort of information should be regularly maintained within the university concerning these people?

The investigation of this problem followed two different but interlocking approaches - namely, (1) to ascertain the purposes for which manpower data are needed, and (2) to make a composite list of manpower data now collected, together with additional manpower data items deemed necessary. Each approach tried to encompass the viewpoints both of universities and of such Federal agencies as the National Science Foundation, National Institutes of Health, and the Office of Education.

In the first approach, it became apparent that the purposes for which manpower information is needed are broad, complex, and almost endless. They range from a university administrator's need to contact a faculty member conveniently and quickly to the need by Federal agencies to make national projections of manpower requirements; from the need for institutional work load studies to the need for the location and registration,

6

nationally, of many types of research talent; from comparative salary studies to studies of changes in the competencies of professional personnel. The multiplicity of purposes and needs for manpower information, either institutionally or nationally, can be inferred by noting some of the ways in which the information crisis on manpower manifests itself:

1. Inability to determine quickly and accurately the availability of professional talent in the event the need arises for assembling a task group;
2. Inability to determine means to replace professional talent, temporarily diverted to research, to perform teaching functions;
3. Lack of vital statistics on faculty and other professional people (such as age, academic experience, fields of interest) for over-all planning purposes; and
4. Inadequate information on the relative distribution of the individual faculty member's effort among teaching, research, and other activities.

The complex purposes revealed in the first approach did not provide a method for deducing the primary simple data items that should be collected and maintained, but an understanding of these purposes and needs did serve as a constant cross-check in the development of a composite list.

In the second approach, a composite list of manpower data items was developed in the following manner. To obtain representative data items currently collected in universities, 195 institutions were canvassed (with 148 responding) for copies of all information or reporting forms on faculty. A basic, preliminary list was made from the items on these forms, supplemented with items specifically suggested by, or taken from the questionnaires of, Federal and other agencies. This list appeared to be fairly complete, and it was then turned into a checklist for the institutions within the Project Group to use in order to survey their own manpower information flow and to identify missing but necessary items, as well as to pinpoint items of questionable utility.

It must be stressed that the list of data items so assembled was predicated on the idea that simple primary data are required for a manpower data file. Whenever suggested items were found to be complex or derivative, they were reduced to simpler atomic units.

Information actually used in decision-making, or in surveys and reports, is often, if not usually, complex and sophisticated. It may be made up of various ratios (faculty to students, library expenditure per student), or complex units (number of Ph.D.'s engaged in basic research in physics or full-time in lower-division teaching). Ratios and combinations of data (even when given a single name) can be multiplied indefinitely. Potential control of all such information needs can be achieved only to the extent that irreducible units of data are collected and so stored as to be subject to manipulation. In almost all cases, university data collecting and reporting errs in using mixed units; some are simple, and others are often combinations of more basic units. A systematic establishment of original data in atomic and basic form is essential.

Thus, through the surveys conducted by each institution, a final version of the item checklist evolved. Because these surveys included an examination of why each data item should be collected, the refinement of the list interlocked with the first approach to the problem of what sort of data should be maintained - namely, the purposes for which manpower data are needed.

The final version of the item checklist, then, is a composite maximum list of items relative to academic/academic-professional personnel; it includes, as far as can be determined, all data items needed within an institution and for external reporting purposes. Although it has been studied carefully by the eight participating universities, much wider and longer experience will be needed to test its adequacy more thoroughly.

The list includes three major areas, and the following outline of categories within each area indicates the kinds of data included. (For a complete list of the data items, see Chapter 10, Section II.)

I. Background, Qualifications, and Experience
    A. Personal Data
    B. Educational and Related Data
    C. Honors
    D. Professional Experience at Other Institutions
    E. Professional References
    F. Record of Employment at This Institution
    G. Travel
    H. Professional Identification and Competencies
    I. Publications and Other Evidence of Creative Achievement
    J. Memberships in Learned and Professional Societies
II. Professional Assignments and Responsibilities
    A. Teaching Assignments
    B. Research Projects

- C. Administrative Assignments
- D. Committee Assignments
- E. Student Relations Assignments
- F. Public Service Assignments
- G. Consulting

III. Distribution of Effort[1]

- A. Teaching
- B. Research
- C. Teaching-Research
- D. Creative Activity in Art and Scholarship
- E. Teaching Through Creative Activity in Art and Scholarship
- F. Public Service
- G. Administration
- H. Formal Personal Education
- I. Intra-University Activities
- J. Other Extra-University Activities (excluding Public Service)

The list, outlined above, is considered maximum since it is recognized that smaller colleges may not wish to collect all the items indicated, either because they do not need full information or because they cannot afford so comprehensive a system. The list may be shortened by omitting individual items or by omitting entire categories, if appropriate. This will not reduce the possibility of comparison or addition of data from different institutions as long as common classifications and categories are maintained. In fact, the actual list of data items, in Chapter 10, is so arranged that a much shorter list can be assembled easily, by deleting some or all of the items not indicated as minimum. Thus, the manpower data item list offers a fairly wide range of compatible data categories for institutions of varying size and complexity.

---

[1] Percent distribution of effort devoted to academic/academic-professional activities. These activities are defined and described in Chapter 3.

Operational Groupings of Personnel Data Items

The items on the list of maximum and minimum manpower data are organized roughly into categories that reflect some descriptive feature, such as personal or educational data. However, this may not be the most effective way to group items, since the organization of data should depend on the ways information is used in the actual operations of a college or university. Other ways of organizing data include grouping items according to a decision-making model, currency and updating of information, and users of data.

Grouping data according to a decision-making model offers a method for building meaningful, useful blocks of information. As used here, the term refers to a general principle that can be followed in requesting, storing, and using data. That principle can be stated in the form of a question: What information is needed to make decisions affecting a given individual at various stages of his career? Many decisions can be specified in advance, e. g., the initial decision to appoint an individual to the institution's faculty, and later decisions regarding rank, tenure, and salary increments. Information of this type can be grouped together for the convenience of top administrators who must make decisions about the individual and about the optimum utilization of an institution's total manpower.

Another approach to item grouping is based on data currency and problems of updating. Some data are permanent, some are cumulative, some change over time. To facilitate the updating process and insure current, accurate records, those items most likely to change may be grouped together; similarly, cumulative data may be kept in a form that can be supplemented periodically. This arrangement cuts across both the descriptive categories and the blocks that are useful in decision-making. For example, an individual's birth date is a permanent datum; number of children is cumulative; his telephone number may change from time to time; however, all these items are usually considered "personal data." To organize data only on a descriptive basis would not allow for easy updating, however logical it is to keep certain descriptive data together.

Yet another way to organize items is to group them for the convenience of various offices that require information about manpower in order to function. However, it is unusual that any two offices within a university require exactly the same set of data. Therefore, each office usually requests information on its own special forms, a practice that compounds the problems of collection and storage and maintenance of current files. It is an unnecessary practice because it is the set of items that is peculiar to each office, and since a single datum may belong to more than one set, duplication results.

Surveys of data needs and uses can uncover those points in the university where manpower information is needed, what items are needed at each point, and the degree of accessibility for each item at each point. All of these points can be tied into a unity if made subordinate to, and connected with, a central office which is responsible for collecting, storing, and updating all academic manpower information and for supplying all other offices at all levels of the organization with manpower information relevant to the operations of each. This creates an integrated system with an established flow of information from determined collection points, to determined storage points, to determined use points.

Within such a system, information cannot be grouped according to any single one of the methods previously mentioned (descriptive, decision-making, updating or user.) A combination of these methods must be followed to avoid duplication and to provide for a smooth flow of data.

The requirements for the development of this kind of system are:

1. A single central office is designated as responsible for collecting, storing, updating and distributing information relative to academic/academic-professional personnel.
2. The total set of necessary information is determined.
3. The points in the university at which information is needed, what information is needed at each point, and the degree of accessibility are determined.
4. Forms are developed and procedures set up to provide for a flow of information into the central office and from there to each subordinate information center.

This system does not commit the institution to any particular method of storing, manipulating, and retrieving information. If a total system is set up, including data processing equipment, the central office would store manpower information in such a way that it would be tied into all other university data and would maintain its compatibility within the institution. Also, it is essential that the basic items of information be compatible between institutions. Basic categories and definitions must be uniform and reductively compatible. However, it is not necessary that the same central office be designated in all institutions, or that the same, or even similar, forms and procedures be used.

Competencies - A Special Set of Data

As the maximum data list was developed, there emerged a special set of data that had unique problems and difficulties. Concerned with the competencies and specialties of academic/academic-professional personnel, this set involves data that might be collected under "Professional Identification and Competencies," which is Item H, Part I, in the preceding outline of data. This set was developed in order to obtain an accurate, current description of the full potential of academic/academic-professional people.

University administrators, particularly deans and department chairmen, need to know the special interests and abilities of academic/academic-professional personnel in order to provide the best possible scope for their talents and to enable them to contribute most effectively to the goals of the university. Thus, such information will make it possible to encourage continued activity in research and other scholarly matters, and to insure that all courses of instruction are taught by persons who are interested and competent.

Manpower resources in science and other fields of scholarship cannot be assessed by head-count, or by a calculation of possible man-hours. Nor can this potential be described in terms of the numbers of individuals under a simple set of categories. The description must be in terms of a complex of skills, knowledge, interests, and even titles. One chemist is not simply the equivalent of another chemist, and addition does not yield simply two chemists. Academic people are "person-specialists." Each comes into a university position that is only broadly defined; each brings his own special interests and abilities with him. Within limits he creates his personal research area, guides students along lines of personal selection, and even creates courses, especially at the advanced level. For these reasons the description of the total potential of such a person is complex and can be achieved only by a combination of categories of data.

Several basic questions, addressed to the academic/academic-professional person, seem capable of supplying the necessary data:

1. What do you consider to be (a) your primary professional identification and (b) your secondary professional identification?
2. In what areas are you now (a) teaching and/or (b) conducting research?
3. In what other areas do you feel qualified (a) to teach and/or (b) to conduct research?
4. In what other types of university activities are you now engaged?
5. What other types of university activities do you feel competent to perform?

6. In which geographic areas do you have special knowledge or competence?
7. In what languages, and to what degree, do you have speaking, reading, or writing proficiency?

Thus, it would be possible to get an accurate profile of a man who considers himself, by training and primary experience, a physicist, but who is now doing research in molecular biology. He may also have pursued some of the newer fields of mathematics and mastered Russian and Japanese.

The determination of professional identifications and research and teaching specialties raises the difficult question of how to classify the information obtained, and how to record it in a manner that permits ready accessibility and retrieval. This may be solved by systematic classification and a list of standardized terms as a key to the language of the system. Such an interrelated list of specialties and sub-specialties within disciplines would also provide a systematic technique for classifying the subject matter of publications, as well as current teaching and research efforts. A large amount of information about each individual thus becomes readily available, if coded and related to some mechanical or electronic method of information retrieval. For the administrator, such lists would provide a basic way of classifying the total academic/academic-professional manpower resources at an institution.

Some of this information can be gathered from a review of the education and experience of each individual. Such a procedure is, however, inadequate. The competencies and interests of scholars tend to be both broader and more specialized than their original training or formal experience. This may appear to be paradoxical, but the very sharpening of specialized interest often leads to a widening of competencies. A philosopher specializing in Kierkegaard might learn Danish; an engineer moving into space-related research might find it necessary to master new branches of mathematics; an expert in stylistic analysis might have to use computer languages. The scholar tends to develop new specialties and, today, with the emergence of new fields, of interdisciplinary research, of rapidly moving methodologies, a scientist may well become, in name and in fact, a quite different sort of expert from what his original qualifications indicate.

What is needed, then, is a profile of each person in terms of ability, competencies, and interests, a sort of qualitative measure of the academic/academic-professional person's potential precisely as such a person.

This profile necessarily must be complex, and it must periodically be made current. Universities should be able to find the combinations of skills, knowledge, and interests appropriate for newly emerging tasks in administration, in teaching and curriculum development, in research, and in other institutional activities. Also, in view of critical national shortages in trained manpower, and of possible national emergencies, inventories of human resources should be available through professional and learned societies, as well as through Federal and other agencies.

In developing the means of building this profile of a person's professional identifications and competencies, the Project Group conducted a series of pilot tests in which academic/academic-professional personnel were asked to identify themselves professionally and to give their special competencies. It quickly became apparent that respondents thought of themselves in quite different terms in giving their professional identifications and in listing their specializations. In the first case, the categories tended to be generic, while specialties were usually given in very specific terms. Moreover, provision for more than one identification was indicated. Thus, an economist working in economic geography, if asked for a primary identification, might simply say "economist." But as a secondary identification, he might offer "geographer." However, as to special competencies, a historian would use such terms as "Constitutional and Legal History" or "State and Local History." After several pilot tests, it was concluded that a list of generic terms for professional identification - chemist, physicist, civil engineer - was not required, but that standard lists of competencies or specialties were indeed necessary.

Specialty lists for scientific and engineering fields, as developed through the National Science Foundation, were already in existence and proved to be adequate for the areas covered. These lists, plus revisions of other lists based on those of the National Institutes of Health and those found in Classifications for Surveys of Highly Trained Personnel by J. F. Wellemeyer, Jr., as well as newly created lists for emerging fields, constituted the basic lists that were tested extensively by members of the Project Group and reviewed by several Federal agencies.

As a result of testing and review, the lists which appear in Chapter 10 (Section III), appear to be comprehensive and workable; they are intended to supplement those lists in use by the National Science

Foundation (as of 1964). A coding system, adapted from the specialties list used with the National Register of Scientific and Technical Personnel, offers the advantage of a single coding system for many disciplines; it is "open-ended" and allows for cross-listing of specialties.

There are 21 major categories and about 900 specialties in the lists. The major categories, arranged according to consecutive blocks of codes, are: Clinical Medicine; Dentistry, Nursing, Veterinary Medicine, and Other Health-Related Specialties; Anthropology; Archeology; Architecture; Art; Commerce and Finance; Education; History; Home Economics; Law; Law Enforcement; Literature; Music; Philosophy; Political Science; Social Work and Welfare; Speech; Library Science; Geographic or National Areas; and Language and Literature.

The lists are not perfect. They are not complete, and will not remain up-to-date. They will need revision in the light of wider usage in order to make them more adequate and realistic. Some lists may prove to be too specific; others may need more detail.

Additions to the lists should not be difficult, and the coding system provides ample unassigned code numbers in most fields. Further flexibility is built in by following the well established practice of using the phrase "Other (specify)" to capture those specialties not mentioned.

The proposed lists, together with the lists used with the National Register of Scientific and Technical Personnel, are believed to constitute the only current set of comprehensive, interrelated lists that are up-to-date and so coded as to be available for the uses herein described. Hence, it is also believed that this set should be used as the basis for data collection, classification, and reporting.

However, implementation of any comprehensive set of lists would necessitate that some agency undertake a continuing responsibility for maintaining the total system of listings. In doing so, the agency might well cooperate with various technical agencies, learned societies, and professional organizations, as the National Science Foundation now does. In addition, if a number of universities were to use this set regularly, their experience would furnish an empirical base for improvement and refinement. In this way, also, compatibility in reporting would be facilitated.

Although the primary purpose of developing these lists was to prepare systematic and standard classifications for describing special competencies, it is suggested that these classifications can also be used as a basis for classifying the subject matter of courses, research projects and programs, and publications and works in progress.

Recommendations

In view of the preceding discussion and the related materials in Chapter 10, it is recommended:

1. That the manpower of a university community (exclusive of students) be recognized as consisting of two groups, namely, those described herein as (a) "academic/academic-professional" personnel and (b) "supporting" personnel.
2. That universities establish two personnel data files, one for the academic/academic-professional group and one for the supporting group. Each file should be so organized that elements common to both files will be compatible and can be brought together as needed. (No further recommendations are made in regard to data on supporting personnel.)

3. That the list of maximum and minimum data items for academic/academic-professional personnel be used as a working base for additional study and development.
4. That, as a tool for building individual profiles of professional identifications and competencies, the specialty lists be further tested and that some agency or consortium of agencies and organizations undertake to develop further and to maintain all specialty lists, much as the National Science Foundation now maintains its appropriate ones.
5. That university organization of data on academic/academic-professional personnel include the following elements -
    a. A single central authority, responsible for the single total file on such personnel.
    b. An automatic internal flow system which will provide for the regular collection of data at appropriate points for forwarding to the central file and which will also provide, with reference to regularly needed information, automatic dissemination of data to use-points. (Thus, personal data, for example, should be collected from the academic person once, reported to the central file, and selectively distributed to deans, the public relations office, and others, as appropriate.)
    c. A system of routine updating for cumulative and changing data.
    d. A method of permanent storage which will permit the correlation of personnel data with all other relevant

data within the university, as well as the manipulation of "prime" data so that "derived" data, of whatever kind, can be obtained as may be necessary or desired.

6. That special studies of the development of "derived" data be undertaken on a continuous basis. The catalog of "prime" data items comprising the maximum list furnishes the elements, both within the personnel data file and in conjunction with a total information system, for the derivation of ratios and correlations for measurements of many kinds. However, the Project Group had to devote most of its time to the fundamentals of the system and pilot tests of derived data were not possible.

CHAPTER 3

THE FULL PROFESSIONAL LIFE: ITS PHILOSOPHY AND ITS DESCRIPTION THROUGH ACTIVITY CONCEPTS

SUMMARY

The major problem confronted in this chapter is the question, "How does one objectively and qualitatively describe academic/academic-professional personnel and the role they play in society?" In answer, the concept of the "full professional life" is developed and its implications explored.

The "full professional life" is that totality of interrelated activities in which the professional person engages in order to carry out his own proper role in society. Within the academic setting, these activities are understood to be precisely those activities through which the distinctive purposes of a university are fulfilled.

Criteria for the development of activity categories are provided, and ten categories are defined and described - Teaching, Research, Teaching-Research, Creative Activity in Art and Scholarship, Teaching Through Creative Activity in Art and Scholarship, Public Service, Administration, Formal Personal Education, Intra-University Activities, and Other Extra-University Activities (excluding Public Service).

Recommendations are made to the effect that the philosophy of the full professional life should be presupposed in describing academic/academic-professional personnel and interpreting their "role," that this "life" should be displayed as a group of interrelated activities, and that the ten activity categories, as defined and described, should be standardized and generally accepted.

Philosophy of the Full Professional Life

The problem of describing, interpreting, and measuring the activities of academic/academic-professional personnel requires that descriptive categories, definitions, and systems of measurement be in accord with a sound philosophical understanding of the academic or academic-professional man.

Professional persons have a kind of pervasive obligation to society which is, in a sense, a public trust. The priest, the minister, the physician, the lawyer, all have a general obligation that cannot be reduced to a set of limited and defined acts. This obligation militates against their subordinating their professional role to private interest or profit. A priest is obligated to serve the religious needs of people quite independently of fees, hours, or difficulties. Every physician is, in effect, responsible for the public health of his community and for the integrity of medical practice. Whatever his personal benefits, a lawyer is continuously an "officer of the court" and a guardian of government by law.

In playing this role in society, the professional person carries on a wide range of activities, which can be divided into two groups: (1) those which are related to, or a function of, his professional life, and (2) those which are entirely personal to him, or at least relate to some aspect of his life not part of his professional role. Thus, a physician may have a private practice, do charitable work in a clinic or asylum, work in public health education programs, and advise national bodies. All these activities relate to his professional role, and these activities, plus all like them, constitute the full professional life of the doctor. They can be distinguished rather easily from the purely personal phases of his life.

It is important, therefore, that both the professional person himself and those dealing with him should think of his professional activities as organically interrelated, as a totality of activity. This totality is his "full professional life."

Several corollaries follow. First, although all the activities of a full professional life take place within a time sequence and within finite periods of time, it is not possible to measure, much less to describe, these activities simply by stating either a definite number of hours per week or definite times assigned to professional activities. The mere number of assigned hours of professional activity is not, by itself, greatly significant and varies among individuals and within the months and years of an individual's life. A physician may have set office hours, a professor may have assigned class hours and a regular office schedule, a nurse may be assigned duties by the clock, but in no case do these assigned times cover the full professional life of the individual.

Second, it is difficult to correlate salaries or fees with the activities of a full professional life. In a sense, the professional person has a commitment of service to society independent of payment. Yet he is, of course, entitled to find a livelihood in his service. There is a long tradition in our civilization that some things cannot be paid for and that some service relationships cannot be turned into commercial transactions. Although clergymen do receive fees or gifts in view of religious services, it is considered improper, and indeed sacrilegious, to "sell" such services. Learning is also a great good that cannot be made into a commodity or even a private good.

If all of this is true of professional people generally, it is eminently true of the professor and of all others designated as academic/academic-professional personnel.

The full professional life of the academic person revolves around two poles, that of his discipline or field, and that of his university position. Simply as a university academic person, he has professional obligations and opportunities that go far beyond any regular and defined duties within his department or school. However, these two poles are closely related and their surrounding spheres intermingle.

Hence, a true and complete picture of the activities of the academic/academic-professional person requires a report covering his full professional life. This concept alone represents his true contribution to both the university and society, and alone gives a sound view of the academic person functioning as such.

Whether or not one adopts an actual reporting procedure covering the total professional activity of individuals, the view herein expressed is believed to be philosophically sound and has received the reflective approval of a widely diversified group of faculty in the institutions comprising the Project Group. Therefore, it is accepted here as a guiding principle.

Criteria for the Development of Activity Categories

In the development of the maximum data list, there emerged - as in the case of data on "Competencies" - a set of "Activity" data items that also had unique problems and difficulties. The activities of academic/academic-professional personnel are considered to involve the ten major activity categories, plus numerous subcategories, for which percentage distribution of effort is asked in Part III of the maximum list. These activities, defined and described in this chapter, provide a basis for qualitatively analyzing the full professional life and for quantitatively measuring certain of its aspects.

During this part of the study, the following criteria were used in developing and testing the categories and definitions of activities:

1. They must be governed by and consonant with a sound philosophical understanding of the nature of the university and of the academic profession. The philosophy and approach contained in the concept of the "full professional life," presents the governing principles underlying the use of this criterion.
2. They must reflect the reality of the activities and correspond to real and significant differences. The faculty member, quite independently of any human categorizing, does go through a set of activities known as "teaching," which are, in nature and reality, different from the set of activities involved in doing "research." The categories and definitions, then, must be developed by an analytical study of academic activities and tested by application to individual persons. A striking example of a concept which emerged from this testing is that of "teaching-research," which is described later.

3. They must exclude the purely personal, the trivial, and the irrelevant. The concept of the "full professional life" furnishes a basic framework for activities which are significant.
4. They must be compatible with the institutional activities or functions shown in the Data Organization chart, since it is through these categories that the activities of academic/ academic-professional persons can be conveniently related to the rest of the institution as well as to other institutions. Through this complex of interrelationships, teaching, for example, can be related to money, space, students, and equipment, and compared with or added to teaching in other universities and settings.
5. They must be fundamental, in the sense that they are reasonably irreducible categories so that most of the complex measures, ratios, and correlations needed can be worked out through manipulation of the data collected within these categories and definitions.
6. They must be such as to be practical. It must be possible to use them to collect, store, recover, and use data, all with reasonable ease and accuracy. The problem here is particularly acute with regard to collecting data since much of it must be obtained from the individual, academic person.

Exploration of New Activity Concepts

Traditionally, the activities of academic people have been categorized primarily in terms of teaching, research, and public and professional services. Additional categories sometimes include administration, student services, and other functions.

During its study of basic personnel data items, the Project Group developed a set of hypothetical categories and definitions of the activities of academic personnel. They were rather conventional, but, through testing, some of them began to be transformed into slightly different and, in some cases, more realistic interpretations of the activities of academic/academic-professional personnel.

From this study, several new categories emerged and were established. The new categories are concerned (1) with the troublesome overlapping of two traditional categories - teaching and research - and (2) with an area involving creative activity in the arts and humanities as distinguished from creative endeavor as found in scientific and other research. Several of the new categories deserve special discussion before proceeding to a description of the finalization of all the major categories and subcategories.

Teaching-Research

One of the earliest indicated needs was for a category to cover research activity when the research was part of the educational process. Asked to divide their academic activities into teaching and research, many professors objected that this simple dichotomy was inadequate to report the true situation and, in fact, forced a misrepresentation of graduate education. They pointed out that, when they were carrying on research with their graduate students, they were, in effect, engaged totally in teaching, and that this was the highest and most authentic kind of graduate teaching and education, while it was, truly and wholly, at the same time research activity. They also pointed out that the simple distinction between teaching and research would mask a significant difference between research in a university department and research in an industrial laboratory or a research institute. The attitude of a senior scientist working on a research problem in a company laboratory is quite different from that of a professor doing a research problem with and for his graduate students. To represent accurately the role of the professor in this unique sort of research and teaching activity, the category of "Teaching-Research" was devised.

Definition: The special term "Teaching-Research" is used to designate that kind of research activity which is carried on with one or more apprentice researchers for whom this research involvement is part of their formal educational program and for whom, therefore, the principal investigator plays the role not only of "research administrator" but of preceptor as well.

"Teaching-research" is used, therefore, to distinguish the kind of research just defined from that research activity in which co-workers and subordinate participants are employed not for their own education but simply to assist in carrying on the research. It does not, of course, include formal instruction about research, i.e., courses in research methodology, which would be strictly a teaching function.

From one standpoint, teaching-research is totally research, and from another standpoint totally teaching. The student is taught his discipline and how to do his research in it through conducting research in association with a formed scholar who is, within this activity and by formal intent, the student's mentor and model. Hence, the activity is not, for one period of time, research, and, for another period of time, teaching. Whatever measurement is used, the activity should not be arbitrarily divided and assigned partially to the teaching category and partially to the research category. However, a large project may well be divided between teaching-research and research. If only one or two "learners" are involved, there may be parts of the project in which the principal investigator works without his graduate students, or in which the students assist in purely ancillary roles. In such projects, the investigator should estimate his effort as between teaching-research and research.

Teaching-research is not limited to the sciences. It may occur in the humanities, mathematics, and professional and clinical work; the scene of this activity may be a laboratory, a seminar room of a library, an archeological excavation site, a medical clinic, a city slum, or a factory. In addition, the learner or apprentice researcher may be, for example, an undergraduate or a graduate student, a graduate assistant, an intern, a resident, a research assistant or associate, or a post-doctoral fellow. The "title" of the subordinate participant should not be used as the sole criterion for distinguishing between teaching-research and research. A graduate student may be simply a hired hand on a research project, while an undergraduate student may be actually an apprentice researcher.

As a unique category, teaching-research should first be reported as an activity parallel to the categories of teaching and of research. However, since it is totally teaching and at the same time totally research, it may be combined with these others for various purposes, as long as it is not counted twice in the same total. Thus, if one wishes to determine the amount of effort expended in a certain department on graduate education, teaching-research must be added to all the formal graduate course work and advising of graduate students. Similarly, if one attempts to determine the cost of graduate education, teaching-research costs must be included. On the other hand, if one wishes to report the total research effort of a department or institution, teaching-research must be added to the other unqualified research in order to obtain a true total.

The category, as a basic description of university activity, is significant both qualitatively and quantitatively. It furnishes a way of thinking about the distinctive nature of research as it occurs in a school situation and of graduate education as it takes place in its most distinctive mode. Moreover, if one measures teaching-research as separate from research without qualification, the institution can be supplied with one measure of the educational orientation of its departments, its faculty and its programs, and with measures from which ratios can be derived showing the degree to which, for example, externally sponsored research has reduced or aided the graduate educational effort of the institution.

From the standpoint both of educational philosophy and of meaningful measurement of proper university activities, the concept of teaching-research appears to be one of the most significant and useful concepts developed in this study.

Creative Activity in Art and Scholarship

Another indicated need was for a category to cover "creative" activity in non-scientific disciplines when such activity was of a kind that could not be appropriately designated as research. As a result of several pilot tests on activity reporting, faculty in the arts and humanities protested that the development of categories and definitions - e.g., research and teaching-research - was focused too heavily on the sciences.

Representative of efforts to deal with this difficulty was one attempt to widen the category of research to include the scholarly activities of people engaged in literature, art, music, and drama, and to re-designate the category as "scholarly-creative activity." This category was to include the activities of the faculty which in some disciplines are called research, in others scholarly activity or scholarship, and in others creative activity. It was to embrace the laboratory research of the physical scientist, the translation of a medieval manuscript by a historian, the writing of a symphony by a composer, or the design for a new city by a city planner.

Although this broadening of the research category lessened the emphasis on science, it presented other difficulties. Now very different kinds of activities were being lumped together. The production of a play or the creation of a bronze is a quite different activity from the clinical testing of a drug or the systematic investigation of seismic waves. In addition, if a professor of English attempts to identify the author of a newly discovered poem, or devises a method of using computers to identify stylistic characteristics of authors, his work would clearly be of the kind normally designated research. On the other hand, if he writes a poem or directs the presentation of a play, his activities are markedly different, and the results of his activities are judged and evaluated by quite different standards. To lump these two sorts of activities together would violate the basic criterion of not confusing activities which are objectively different, and different in ways which are significant and important. Moreover, some faculty, especially those in the natural and life sciences, felt that the reporting of "scientific" research might get muddied if the primary category was allowed to become so broad a mixture. Instead, therefore, of expanding the original research category, it was given a tighter definition and a new category of "Creative Activity in Art and

Scholarship," was developed.

Definition: The personal production of works of art, such as paintings, ceramics, poems, plays, novels, symphonies; the direction and presentation of plays, concerts, and other performances; creative designing in architecture, tapestries, and the like.

The name of this new category aroused considerable discussion because of the use of the term "creative." It was generally recognized that creativity was not limited to the arts and humanities and that scientists, in devising research, designing instrumentation, and elaborating theories were often creative in the finest sense of the word. Hence, some feared that the use of the term in this definition would seem to deny, by implication, the creativity of scientific research. This, of course, was not the intent; however, no substitute term was found which could gain general acceptance.

The new category proved to be practical. There was general acceptance and approval from faculty, the protests against a "scientific" bias were greatly reduced, and the new category was generally believed to be necessary and significant.

Teaching Through Creative Activity in Art and Scholarship

Once the preceding category was devised, tested and accepted, a companion category, parallel to that of teaching-research, was almost automatically necessitated. The analogy with teaching-research made the creation of this category an easy matter and a definition was readily accepted for "Teaching Through Creative Activity in Art and Scholarship."

Definition: That kind of creative activity which is carried on with one or more apprentices for whom this involvement is part of their formal educational program and for whom, therefore, the principal artist or scholar plays the role not only of director and manager, but of "preceptor" as well.

The greatest advantage of the two related categories, just described, is that they enable activity reporting to represent more accurately the different sorts of activities within the university. Such reporting will thus not only produce a more objective picture of the actual life of the university, but it will constantly remind administrators and others of the balance needed in this life, and will point up imbalances as they develop.

The Final List of Activities: Major Categories and Subcategories

The three new activity concepts emerged from testing a tentative and conventional list of activities. Although not all the conventional activities underwent radical revision, often traditional definitions were refined, new emphases worked out, and subdivisions made sharper. The result was a basic list of ten major categories, which together detail out and display the full professional life of the academic/academic-professional person.

Within these basic categories, subcategories of varying importance and uses were developed. They serve both as possible subdivisions of the major categories and as part of their definition. They indicate what sort of things are included under the broader headings and so help to concretize and interpret the general definitions. Among these subcategories, too, one may introduce those subheadings which are imposed by special needs, whether within the institution or in relation to external reporting demands.

After numerous pilot studies, the Project Group concluded that the full professional life of the academic/academic-professional person can be displayed through these basic categories of activities:

1. Teaching
2. Research
3. Teaching-Research
4. Creative Activity in Art and Scholarship
5. Teaching Through Creative Activity in Art and Scholarship
6. Public Service
7. Administration
8. Formal Personal Education
9. Intra-University Activities
10. Other Extra-University Activities (excluding Public Service)

If these basic categories are given definite limits and relatively clear definitions, they can constitute the compatible base for reporting all academic-professional activities within colleges and universities. The smallest junior college and the most complex university could employ this common list and so report gross divisions which can be "added" as between institutions and used as a reliable base for national statistics and studies. This gross compatibility would be in no wise impaired by subdivisions under any or all of these categories, provided the subdivisions are such as to leave intact both the gross total, and the original definition of the primary category.

In this list of activities, categories 1-5, 7, and 8 are distinguished according to the basic nature of the activities themselves. They encompass kinds of activities. Hence, these categories are given fairly clear-cut definitions.

Category 6, "Public Service," is unique. In a sense, everything done in and by a university looks to the common good and is, in fact, "public service." Here a multiplicity of kinds of activities is included, all of which are directed immediately to the public outside the university; that is, the category is defined as a combination of formal university activities with direct public service purposes.

The last two categories are groups of remaining activities, which between them include all activities not expressly included in the prior eight categories. The principle of division, as between 9 and 10, is not the nature of the activities themselves, but the circumstances of their direction, whether to intra-university or to extra-university ends. The subdivisions under these two groups resume the same principle of division as in the first eight categories, namely, the kind of activity. The introduction of these groups in the 9th and 10th place is the result of practical considerations. The alternative would have been a much more extended list of categories, many of which would represent a very small fraction of most academic persons' time or effort.

By providing "other" subdivisions within the last two basic categories, the ten categories as a unit become both complete and open. Added together, they will always equal the full professional life of the academic/academic-professional person and the 100 percent of his professional "effort" (or time). Moreover, new or unrecognized activities can always be included, expressly or implicitly, in the last two basic categories.

Teaching

Definition: Instruction of students in formal courses and supervised study.

The activity envisioned here is the total activity of teaching, not simply the actual contact in classroom, laboratory, or study. It includes directly preparatory activities, such as preparation for class and lecture, the setting-up of demonstrations, and preparation for laboratory experiments. It includes all interaction with students in relation to their instruction, such as academic counseling and special review or coaching, and all forms of evaluation, such as correcting papers and determining grades.

The main subdivision of teaching activity is by level of instruction. Insofar as credit courses are concerned, the following levels are identified:

1. Terminal: terminal and occupational courses, usually leading to a certificate, designed primarily to prepare students for immediate employment in an occupation. Such programs are not designed to be equivalent to the first two or three years of liberal arts education, or of pre-professional education, although credits may be applied to an associate degree.
2. Lower-division instruction: courses established primarily for freshmen and sophomores.
3. Upper-division instruction: courses established primarily for juniors and seniors.
4. Advanced professional instruction: "Professional instruction" is that given in curricula which prepares specifically for the practice of a profession. "Advanced" is here used to refer to courses requisite for the first professional degree in programs which require either a baccalaureate degree or some collegiate preparation prior to admission and which are not graduate programs. Such programs include law, medicine, veterinarian medicine, dentistry, social work and the like.
5. Graduate instruction: courses and other work leading to the Master's and Doctor's degrees, including degrees beyond the first professional degree; thesis and dissertation work is included even though it may not be assigned course numbers.
6. Post-doctoral: formal training beyond the Ph.D., as well as post-M.D. internships and residencies.

Non-credit course instruction is organized instruction in adult education, extension, short courses, conferences and the like, which does not apply toward a degree or certificate of higher education.

A second subdivision of teaching activity relates to the type of teaching and includes:

1. Class teaching: activities of organized group instruction by lecture, recitation, discussion, and group demonstration.
2. Laboratory teaching: activities of organized group instruction through student experimentation, use of instruments, and other related procedures.
3. Seminar teaching: activity of instructing small groups of students through cooperative study and discussion.
4. Radio and/or TV instruction: teaching carried on through radio or television, and, hence, in studios containing broadcasting equipment.
5. Studio teaching: activity of instructing in the creative arts through student practice of the arts.
6. Physical education teaching: activity of instructing and directing physical exercises, games, sports.
7. Military "field" instruction: activities of directing drill and other military activities.

Other breakdowns are possible, both within these two main subdivisions, and in addition to them. Any institution can make further distinctions as much as it wishes for its own purposes, as long as the basic definition of the main category remains intact, and all the subdivisions can be added together to give a total compatible with totals in other institutions.

Research

Definition: Methodical study and activity carried on in order to augment and develop knowledge in any field.

Since teaching-research has been established as a basic category, research of that kind is to be excluded here. Therefore, in reporting the total amount of research being done, these two categories should be added together. Excluded also is instruction about research as in general courses in methodology, which should be reported under "teaching."

With these exclusions, the definition should be read in its broadest possible meaning. There is no suggestion of limitation to the natural sciences. The historian validating the accounts of Magellan's voyage, the English scholar determining the sources of Marlowe's plays, the philosopher interpreting the text of Kant, are all engaged in research, as well as the physicist or chemist testing hypotheses in laboratory experimentation. "Knowledge" in the definition should be taken broadly. It includes many variant cognates, such as new information, new theories, new insights, deeper understanding, and new integrations. The increase in understanding that results from the philosophical analysis of a problem is an augmentation in the order of knowledge, as is the deeper insight which comes from the humanistic critique of a poem. Critical editions and scholarly translations should likewise be included.

The term "research" takes many modifiers and may be subdivided in many ways. Most of the divisions now necessary for reporting purposes exist because of reasons extrinsic to the nature of the research itself. A division according to fields of knowledge, while in some respects artificial, is nonetheless related to the nature of the research. It is hoped that the list of competencies for academic/academic-professional personnel can also serve as basic divisions of research by field.

Probably the most common current subdivision of research is the breakdown into three types: basic and applied research, and development. This division is almost unavoidable in view of certain policy problems in national planning, in Federal legislation, and, perhaps also, in university management. The classification is, however, widely criticized and is unpopular with many scientists and university people. If the division rests on whether the research has practical applications, results in new products, or is without these consequences, the problem is that even the most humdrum design of "hardware" yields some measure of increase in knowledge while the most abstract and theoretical research ultimately has, or at least may have, far-reaching practical results.

And yet there is a difference here which, for many purposes, is significant. An engineer who undertakes to do research in order to design a metal-piercing projectile approaches his work with quite a different intellectual attitude from that of the physicist exploring the subatomic structure of matter. Ever since Plato it has been recognized that the intent of the knower, and the purpose of the knowing, internally modifies the act of knowing.

The division, therefore, should be viewed as based on the primacy of the intent and the immediacy of the consequences. Thus, to undertake to develop a device for micro-measurements of something hitherto successfully measured only on a macro scale is to undertake a development project, even though the process will generate new knowledge, and even though a university person may be personally more interested in the incidental findings relevant for theory. On the other hand, the discovery of Boyle's law was a piece of basic research, even though it has had hundreds of practical applications. Since the division must rest, then, not on an "either-or" possession of intrinsic characteristics, but on the degree of primacy of intent and the degree of immediacy of practical results, there will be borderline cases.

The divisions according to primacy of purpose and consequences may be set up thus:

1. Basic research: methodical study and activities carried on with the primary intent and immediate consequence of augmenting and developing knowledge in any field. Excluded, therefore, is research which is undertaken with the primary intention of practical application or product development and/or the immediate results of which will be such application and development. Thus, the results of basic research will contribute to theory and understanding, to the revision of knowledge and its accumulation and, out of all this, in turn, may flow innumerable procedures, formulae for action, devices, instruments, and other outcomes.
2. Applied research: methodical study and activities which augment and develop knowledge, but are carried on with the primary intent or immediate consequence of practical application.
3. Development: methodical study and activity which augment and develop knowledge, and the systematic use of knowledge carried on with the primary intent and/or immediate consequence of designing and producing useful prototypes, materials, devices, systems, methods or processes. The routine reapplication of procedures and formulae already worked out, the repetition of tests, the reproduction of existing designs and products, and the like, are all excluded. Thus, for example, quality control

and routine product testing do not fall under this category. It may be pointed out again that activities thus defined as development often - perhaps always - augment knowledge, and sometimes have a most important feedback into the structure of theories and methodologies.

It is intended that these definitions of basic research, applied research, and development, be consistent and compatible with those used by the National Science Foundation and other agencies. It is believed that the reformulations here offered clarify the principle of division and may make it more usable and more acceptable, while still achieving the informational goals of these agencies and of university administrators.

For many national and institutional purposes, it is necessary to subdivide research according to the source of support. The basic division is between university-supported research and externally-supported or "sponsored" research.

1. University-supported research: research and development carried on by staff members where the expense is borne by institutional funds. This includes research carried on by staff members even when such research is not separately budgeted.
2. Externally-supported or "sponsored" research: research supported by sources outside the university. Such research may be conducted within institutional departments, or within special research divisions. Subcategories of "sponsored" research, identified according to source of funds, are as follows:
    a. Federal: research supported by funds awarded by an agency of the Federal government.

b. State agencies: research sponsored by state agencies other than a state university budget.

c. Private foundation: research sponsored by funds from a non-profit, private foundation.

d. Industry: research sponsored by any business, industry, or comparable organization.

e. Individual sponsors.

f. Other.

A number of extrinsic or accidental qualifications of research, particularly in the sciences, are important only because of current interests of the government. Major qualifications of this sort are here defined, generally in accordance with the usage of some government agency. They are not mutually exclusive. Atomic energy research, for example, may be also defense-related or health-related. Space scientific research is often also defense-related. Hence, these qualifications do not constitute a subdivision or a set of subcategories under research. By the same token, the percentages of research effort given for these categories in activities reporting should not be expected to add up to 100 percent of research effort. The following is a group of possible qualifications of research activity, not an integral set of subcategories divided according to a single principle of division, not mutually exclusive, and not additive among themselves in final reporting.

1. Health: all research relating to human health, bio-medical and bio-social studies of the physical and mental diseases, other crippling and killing impairments of mankind, nutritional problems, health problems not identifiable in terms of disease entities, basic research in the processes affecting disease and well-being, and the development of improved

methods, techniques and equipment; excluded is the actual practice of medicine except as it implements research. This definition is intended to be consistent with that used by the National Institutes of Health.

2. Atomic Energy: all research relating to the development and production of atomic energy, the use of radioisotopes or high energy radiation and high energy physics, and the control of radiation; excluded is non-nuclear research in which radioisotopes are merely used as a tool. This definition is meant to be consistent with that used by the Atomic Energy Commission.
3. Space Science: all research activities associated with the exploration of space by manned or unmanned vehicles, and with the space environment and its effects on human, plant and animal life.
4. Defense: all research which has intended or implied defense or military application.
5. Agriculture: all research directed primarily toward understanding and improving the production of animals and plants of economic and cultural importance to man.

Teaching-Research[1]

Definition: That kind of research activity which is carried on with one or more apprentice researchers for whom this research involvement is part of their formal educational program, and for whom, therefore, the principal investigator plays the role not only of "research administrator" but of "preceptor" as well.

Teaching-research may be subdivided according to any of the subcategories of research.

---

[1] See earlier section of this chapter for discussion of this category.

Creative Activity in Art and Scholarship[2]

Definition: The personal production of works of art, such as paintings, ceramics, poems, plays, novels, symphonies; the direction and presentation of plays, concerts, and other performances; creative designing in architecture, tapestries, and the like.

Teaching Through Creative Activity in Art and Scholarship[2]

Definition: That kind of creative activity which is carried on with one or more apprentices for whom this involvement is part of their formal educational program and for whom, therefore, the principal artist, or scholar, plays the role not only of director and manager, but of preceptor as well.

Public Service

Definition: All activities primarily intended as services to the community, the state, and the public of this and other countries (exclusive of all activities reported in the five preceding categories). Or: all activities in which the individual's academic and professional competence is made available to the general public or to special groups.

Categories of possible interest in different types of institutions follow:

1. **Consulting:** Here only that consulting should be included (whether with or without fee) which serves the public interest, e.g., consultation to the local school system, to the Police Department, to community health agencies. Consultation to profit-making organizations should be listed under "Other

---

[2] See earlier section of this chapter for discussion of this category.

Extra-University Activities."

2. Service on government committees, councils, panels.
3. Service on professional community committees.
4. Editing professional journals.
5. Participation in accrediting procedures.
6. Judging contests and competitions.
7. Other.

Administration

Definition: The coordination and direction of others in regard to the formulation of policy, decision-making and its implementation.

Administration can be subdivided according to the kinds of persons directed, and the activities involved. The following basic kinds of administration can be distinguished:

1. General: administration of all university personnel with regard to all university activities, e.g., the administrative activities of the president, executive vice president, chancellor, and other comparable officials.
2. Academic: administration of academic/academic-professional personnel in respect to the complex of teaching, research and related activities, e.g., the administrative activities of academic deans and department directors.
3. Research: administration of an organized body of persons working on research, e.g., the administrative activities of the director of an archeological expedition, or of a team of scientists.

4. Creative activities: administration of an organized body of persons engaged in creative activities, e. g., the administrative activities of the director of a playhouse group.

5. Supporting services: administration of persons engaged in supporting services, e.g., the administrative activities of the business manager, the director of housing, or the director of student health.

Formal Personal Education

Definition: All activities relating to courses, workshops and practica in which one engages as a student, and one's own thesis or dissertation research and writing. (This includes all attendance at class, even though no degree is sought.)

This category is to be strictly interpreted. Obviously, a great many, perhaps all, of the activities constituting the professional life of academic people contribute to their own education and personal development. For this reason, it was necessary to limit the category to "formal" education, i.e., to activities meeting degree requirements, or to actual enrollment in classes or workshops, as students. No distinction is made between study at one's own institution and study at another institution.

This category, therefore, does not include the general reading in one's own field, travel experience, and similar activities in which academic and professional people engage, even though these activities do contribute to their continuing education. These activities, if significant in amount of effort, may be allocated to the categories teaching, teaching-research, research, teaching through creative activity, creative activity, and administration as seems most appropriate in each case.

No generally or nationally significant breakdown of this category emerged during the study. Presumably, subdivisions would serve local and limited purposes. Possible subcategories are:

1. Formal course work:
    a. For degree credit
        (1) Master's
        (2) Ph.D.
        (3) Other
    b. Not for degree credit
2. Participation (as a student) in workshops, institutes, and other forms of continuing education.
3. Work on thesis or dissertation:
    a. Master's
    b. Ph.D.
    c. Other

There is an overlap between work on thesis or dissertation and the basic category of "Research." For accuracy in overall reporting, the research reported here should be allocated to, or at least subsequently added to, the effort reported in the research category. However, the amount is so small, in reference to aggregate reporting, as to be negligible. On the other hand, for intra-university management the item is more significant in terms of personal development than as a research effort. Hence, research on one's personal thesis or dissertation should be entered here.

Intra-University Activities

Definition: All other activities by which one makes one's skills and resources available to other persons or organizations within the university for university purposes (exclusive of activities reported under all preceding categories).

Examples of activities which fit under this heading are:

1. Working with student groups in an advisory or supervisory capacity.
2. Working on university boards and committees.
3. Student counseling (other than that related to teaching).
4. University staff activity (in which an individual makes his special skills and resources available to an administrator).
5. Participation in fund-raising activities.
6. Participation in public relations activities.
7. Other.

Other Extra-University Activities (excluding Public Service)

Definition: All activities directed to persons, agencies, and other organizations outside the university which are not primarily Public Service activities. The main activity here is consultation for profit-making organizations in business and industry.

A study of problems in a factory, consultation to a maker of aircraft, advisement to an advertising agency would fit here. Consultation for a public school system or a hospital; studies of problems in a city government; service on community health programs, whether remunerated or not, would be classified as "Public Service."

Recommendations

It is recommended:

1. That the philosophy of the full professional life be presup-

posed in describing academic/academic-professional personnel and their role in society.

2. That the full professional life be described and displayed as a group of activities through which the distinctive purposes of the university are carried out and for which the basic categories have been presented in this chapter.
3. That the activity categories defined and described in this chapter be standardized and generally accepted. (Borderline items will no doubt be uncovered through additional use, and, in view of them, the definitions of the categories should be sharpened. However, it is believed that almost all desired or needed additions can be inserted as subdivisions within existing categories.)

CHAPTER 4

ACTIVITIES MEASUREMENT DATA

SUMMARY

The ten activity categories discussed in the preceding chapter are essentially qualitative in character, defining and describing kinds or types of activities that display the full professional life in a university setting. The major problem attacked in the present chapter is how to measure the full-time person's participation in such activities.

A basic measurement concept of "effort" is worked out as a basis for quantitative reporting. It is recognized that this concept is controversial both at the analytic and philosophical level and at the level of practicality.

With regard to the first level, it is believed that the concept of effort is sound and more appropriate than any other so far proposed. It is recommended that this concept be accepted as a matter of principle.

Regarding the level of practicality, it is recognized that there are difficulties, both theoretical and procedural. These have not all been resolved and probably cannot be expected ever to reach full resolution. However, it is urged that the concept not be abandoned because of these practical difficulties (which exist in all current systems) but that further exploration be made of ways to apply the concept more effectively.

The other problem examined in this chapter is how to measure the activities of part-time academic/academic-professional personnel and compute the full-time equivalency of such people. Although several methods are discussed, it was possible only to make a beginning in this special area of manpower analysis. It is recommended that additional study be made of this problem, based on the conclusions presented and the approaches suggested.

"Effort" Versus "Time" as a Basis for Measurement

Once the concept of the full professional life is accepted, a basic unit has been established for measuring the activities of academic/ academic-professional people. One full-time person's total professional life is the basic unit which must be used. This is obviously not a mathematically uniform unit. Because of many factors, the total activity of individuals differ widely. Yet, with reference to time, energy, interest, and ability, the differences are within definite and finite limits. Although the activity of Professor B may be twice as intense and twice as productive as the activity of Professor A, when gross statistics are derived from a large number of professors, differences will probably tend to even out.

If the total activity of the full-time academic professional is accepted as the unit, how can the distribution of this human unit of activity be measured over the various kinds of activities? In other words, if the total activity of one full-time person equals 100 percent, on what basis is the percentage to be calculated?

Since all human activity takes place in a temporal sequence, it can be measured by a time unit. This is, of course, a strictly quantitative measure.

Back of any quantitative measurement lies the assumption that each unit cast into the measuring system is like every other unit. In the measurement of concrete things, this assumption of equality is generally an imposition on reality, but, in many cases, the differences are so slight that they can rightly be disregarded. However, when time measurements are applied to human activity, they are most properly applied only to such activity as is so uniform, so repetitive, so "leveled," as it were, that one hour of it is very much like (though never exactly like) every other hour. Repetitive activities like sweeping, bookkeeping, typing, and repetitious production line operation are so "level" that a simple time measurement does little violence to the real nature of the activity and serves as at least one suitable measure.

For types of human activity which vary widely in nature, equal time periods are no longer enough alike to permit the differences to be ignored. Thus, activities of academic/academic-professional people cannot appropriately be measured or described only in units of time. The three hours a surgeon spends on an intricate open-heart operation are essentially different from three hours spent by the same surgeon in simple and routine lancing of boils. The hours spent by a top research scientist in solving a complicated research problem or elaborating a sudden insight into a viable theory are essentially different from the hours spent by the same scientist in checking routine student laboratory reports or quiz papers.

In addition to the intrinsic impropriety of attempting to measure or evaluate the activities of a full professional life solely in units of time, there is an added practical difficulty. Academic and professional people do not live or work "by the clock," or in a determinate place. Even if time measures were appropriate, it would be exceedingly difficult to apply them. True, academic people will report their activities on the basis of time if required to do so, but if given an opportunity - for example, in interviews - the majority will protest the sole use of time units.

These conclusions were empirically verified during the Project. In various pilot studies, the majority of academic and academic-professional people objected to a simple time reporting of their work. They almost instinctively rejected the theoretical applicability of a number of hours or a percentage of time, and as stongly emphasized the subjective character of any estimate of hours or time percentage. Although some professors, when pressed to use time measurements, arbitrarily set their workweek at 40 hours and based their estimate on such a fictitious week, nothing could be more incompatible with the concept of a full professional life.

Constant requests for time reporting, supported by the very real pressures of granting and contracting agencies, not only may bring academic people to accept a time unit reporting system, but may even lead them to begin to think of themselves within this framework. However, in a world already heavily commercialized, every effort must be exerted to preserve in their true nature those human activities which are not directly measurable in money, time, or other material ways.

Although a purely quantified temporal measure is inappropriate for academic activities, it is not easy to find alternate measures.

An effort was made by reflection on the nature of academic activities and on the variations within such activities to determine relevant factors which might serve as a basis for new units of measure. Through this analysis, and the subsequent discussions to which it was submitted, three relevant factors emerged.

The first of these is the degree to which a given activity calls into play the full capacities of the individual - his native ability, experience, learned and acquired skills. Thus, the surgeon when dealing with an unusual and difficult brain operation calls into play to a much higher degree all his professional capabilities than when he simply lances a boil.

The second factor is the degree to which the activity calls forth an expenditure of energy - of physical, emotional, and mental power.

Thus, the expenditure of attention and of energy is much greater in an hour of fast-moving, high-level discussion with fellow scholars than in a casual conversation.

The third factor is time, because two hours of intense activity at maximum exercise of capability is quantitatively greater than one hour of equally intense and demanding activity.

If a combination of (1) degree of engagement of capabilities, (2) degree of intensity of application, and (3) amount of time is used, a better measure of the activities of a full professional life will be obtained than if only time is used. If a surgeon works at teaching, minor examination, as well as surgery, for 50 hours during a week in which he performed one extremely difficult two-hour operation, it would be a gross misrepresentation to say of these two hours that they represented only 1/25 of his effort that week.

These three factors are, therefore, combined in a complex evaluative and measuring concept designated as "effort." This measure of effort is defined as a combination of the degree of activation of total capabilities, the intensity of application and energy expended, and the amount of time expended. By thinking of "degree," "intensity," and "amount," a rough quantification is achieved without eliminating the qualitative nature of the factors themselves.

Although to the majority of faculty members participating in the pilot tests, the concept of "effort," as here described, was more acceptable than a mere "hour" or "percentage of time" base, serious concern was expressed by some people over the subjectivity and non-quantitative character of "effort." Percentages of "effort" are necessarily estimates made by the individuals reporting; obviously, exact numerical evaluation is impossible.

Based upon conclusions drawn from pilot tests and interviews, the consensus of the majority of the Project Group was, however, that the concept of "effort" and the measurement of activities in percentages of "effort" are more consonant with the nature of these activities and are generally more acceptable psychologically to academic/academic-professional people. Reporting by percentages of "effort," as defined here, does include temporal measurement, but adds to it other important dimensions. In practice, this reporting cannot be reduced to the precision of a time-clock; it depends upon reasonable estimates. These allocations, in turn, can and should be regularly checked, close to origin, by a director or other supervisor; they should also be cross-checked with other objective and independent data.

There are, then, adequate grounds - theoretical and practical - for preferring the concept of "effort" not only as a conceptual tool for understanding the work of academic/academic-professional people, but also as a basis for measuring their activities.

Relating Activities to Salary

In the development of a philosophically sound view of the activities or life of an academic/academic-professional university person, the term, "full professional life," has been used to cover the totality of activities carried on in function of the dual and interpenetrating role of "university person" and "academic-professional person." Analysis of this concept revealed that the full professional life is not a direct correlate either of assigned times and assigned periods of time or of definite salaries, stipends and fees.

Yet it is still true that the activities of such persons must be related to money. Cost accounting, even in the academic life, is necessary for evaluating, projecting, and planning, and money is itself one kind of measure.

How can a correlation be set up between academic activities and financial categories which will be significant and meaningful, but which will not distort the activities or violate the concept of a full professional life? In opening up this question, an unexpected complexity appears.

A simple approach would be to ask: What does the university pay an academic person for? Clearly, there are certain assigned duties which the university administration expects an academic person to perform. He is given certain classes to teach at definite times and places. There are other things, less well defined, which he is usually expected to do, such as private counseling of students. On the other hand, does the university "pay" a faculty member for reading a paper before a learned society? It is hard to say that he is "paid" to do this, yet appointments, promotions, and salary increases in most universities take into account precisely such things, and the university is normally highly interested in such activities of faculty. If one pushes in this direction, one can almost say that the university "pays" the faculty member for his full professional life, or, if the concept of "payment" or "salary" is found inappropriate because of the nature of a professional life, one can say that the university provides appropriate "support" for the faculty member precisely in view of his full professional life, just as the Church or the parish supports a priest in view of his religious life and service.

Other practical difficulties also arise. There are many things, very similar to the presentation of a learned paper, in which the university is equally interested and for which the faculty member receives extra compensation. Thus, faculty members may receive royalties on books and, within limits, fees for consultation. Both publication and consultation are clearly part of the full professional life, and are matters of great interest to university colleagues and administrators. It has been suggested that, from the standpoint of accounting, "double" compensation cannot be allowed to show. Would it distort a cost accounting report to allocate a part of one's salary to that consultation for which a specific fee was also received?

Another practical difficulty is the matter of determining the percentage of salary to be charged against a grant or contract. Unfortunately, the pressure in many government agencies is to introduce here more and more rigid "business" concepts and procedures, which seem, at least, to be at variance with the concepts previously advanced. However, accountability in the use of Federal funds is of the highest importance, and both the university and the academic personnel involved have a serious responsibility to see that salaries charged to grants and contracts have a proper relationship to the actual contribution of those involved.

Despite the complexity of the situation, ways must be found to correlate the activities of the full professional life with financial remuneration.

During this study, it was suggested that it might be assumed that "salary" related only to "assigned" duties, ignoring all other activities as far as allocation of salary was concerned. However, since the most clearly assigned duties are teaching, a very minimum testing of this method revealed that the cost would be heavily and unrealistically shifted to actual teaching.

An alternate method of dividing activities into those related to salary and those not so related was then suggested. The activities constituting the full professional life would be subdivided into those considered "institutionally-related" and those "non-institutionally-related." This division proved to be unmanageable, for two basic reasons: (1) the definition and understanding of these concepts were likely to vary from institution to institution, and (2) it was found that academic people often have difficulty in ascertaining precisely what a university expects them to do and/or what they believe they are being paid to do. It was decided, therefore, to abandon this division because it could not be made compatible between institutions nor could a common understanding be developed within institutions.

Hence, a different approach was indicated. Upon reconsideration of the nature of the full professional life, it might be reasonably assumed that the salary of the full-time academic person is related to the activities which constitute that life. When the list of activities is examined for this purpose, two of the ten categories appear somewhat extraneous; namely, Formal Personal Education and Other Extra-University Activities (excluding Public Service). If these two categories are excluded from cost allocation, then the ten categories are reduced to eight for correlation with financial data. Percentages of distribution of effort can be adjusted to the same purpose. To illustrate: Assume an individual reports percentages for all ten categories (although this is unlikely to happen). If the two categories which are extraneous in salary allocation are eliminated, the remaining categories may account for, say, 90 percent of his reported effort. If these eight categories are now considered to constitute portions of 100 percent of effort rather than of 90 percent, each of them must be adjusted, by distributing the 10 percent formerly allocated to the two extraneous categories. Thus, although a man may have originally reported 30 percent of his effort to teaching, this percentage is now adjusted to 33-1/3 (30%/90% = 33-1/3%/100%). By applying the adjusted percentages to an individual's salary for the same period as was used to report effort, one obtains salary allocations for each category of activity.

Given these basic allocations, it is possible to combine the results in various ways. If one is studying the total cost of instruction, the categories of Teaching, Teaching-Research, and Teaching Through Creative Activity in Art and Scholarship could be combined. Similarly, if one wishes a money measure of the total amount of research, the categories of Research and Teaching-Research could be combined. A small college might wish to collapse the categories of Research and Creative Activity in Art and Scholarship into a common category of creative work and scholarship. Various combinations thus become possible to serve different purposes, and all are legitimate provided the same item is not counted twice in the same addition.

It is believed that the preceding approach of collapsing categories of activities can be refined and may thereby serve as a way of relating activities to salary within the framework of the full professional life.

Activities Measurement and Support from Federal Contracts and Grants

Criticism of the activities reporting already proposed arises largely from anticipation of discrepancies between such reporting and the effort charged against Federal contracts and grants. Two different situations might be discussed.

Fractional Support

In cases where only a fraction of an individual's effort is used in externally sponsored research, there would appear to be no special difficulty in estimating the allocation of effort within the framework of academic/academic-professional activities and in assigning a percentage of salary recovery in accordance with that allocation. There is no reason to expect a sponsoring agency to support more than the fractional allocation in the case of a regular university academic person who is expected to carry a spread of activities within the categories of a full professional life.

Full-time Support

In the situation in which the total salary of an individual is charged to a Federal grant or contract, should this mean that the individual would completely cease all other activities except that of research (taking as the case a project research contract or grant)? Should it mean that, in effect, he would narrow his full professional life to the one activity of Research and show 100 percent allocation of effort to it and to it alone?

In the case of full-time salary recovery, this situation would be regrettable from the standpoint of the individual, of the university, and of the Federal agency. The precise advantage of being in a university lies in the genuine freedom and real opportunity of engaging in the wide range of activities already identified with academic/academic-professional people. The university person is what he is because he is part of a community of scholars, of teachers and learners; he is a special kind of researcher because he is not just a researcher. He has the constant stimulus of skirmishing with keen young minds, of contacting men in a wide range of disciplines, of constantly trying to communicate in his field. In other words, the displaying of his effort through the academic activities spectrum increases his peculiar value within the area of research. All of this makes him of greater value to his research project, quite apart from the fact that, as a teacher, he can enlist bright young graduate students as co-workers in his research.

It can be reasonably argued, then, that as long as a man's total research effort is devoted exclusively to his research project and as long as research constitutes the major part of his total professional life (say, about 90 percent), his total salary can and should be paid from the grant or contract.

But does not the remaining 10 percent contribute to the university's activity and thus become chargeable to its budget? This is true. The seminar that the man in question might be giving would simultaneously enhance his research and so be itself of value to the research project and, at the same time, strengthen the educational work of the university. However, this situation must be considered not only from the standpoint of value received but of expenditures imposed. The researcher is generally either a regular member of the academic community or a person added precisely in view of a particular research project. In the latter case, the university could not have "bought" even 10 percent of this man's activities if there were no grant or contract. If the man is appointed, if it is agreed that broad participation (within a modest limit of effort) should be allowed for the individual's benefit as well as for the good of the research project, and if the university is required to pay for 10 percent of his salary, the university is making a forced addition to its budget. The project would thus be the cause of a direct additional financial burden on the university. In effect, the grant or contract would become a forced matching grant. If the individual is a regular member of the university faculty, the loss of 90 percent of his effort will require a full-time replacement in view of this contract or grant, and the added financial burden to the university would be the same.

If, however, this line of reasoning is not acceptable and a vigorous business quid pro quo insisted on, a different approach from the same "business" grounds can be taken. It could be argued that on a strict "hiring" basis, a Federal agency can reasonably expect to bind a full-time person to a normal work week only. It seems reasonable to evaluate such a work week at forty hours. Several studies within the institutions comprising the Project Group indicate that the actual work week of academic/academic-professional people ranges from 40 to 70 hours, with the majority falling between 50 and 60.

If this is so, then roughly 15 hours on the average or about 25 percent of the individual's time would be outside of the commerce of quid pro quo. Twenty-five percent of time allocated might reasonably be taken as at least covering the 10 percent of effort suggested above. Thus, the same conclusion is reached, namely, that full-time "employment" on a research grant or project with full salary recovery can allow for other university and academic activities (including some minimal teaching) and, for the good of all concerned, including the Federal agency, should so allow.

In order to achieve this result, some individual researchers and some institutions have set the academic work week at 40 hours. This does indeed clear the accounting problem, but it runs counter to the basic analysis of the full professional life here advanced.

Uses of Data from Activities Reports

Whatever information can be gathered from the activities reports of full-time academic-professional personnel will serve all the general purposes of university data collecting and storing. However, some specific comments are in order.

The Interpretation of Academic Life

Since the activity categories discussed previously are based on an interpretation of the full professional life and on an objective specification of the activities constituting that life, data from activity reports, when used in the aggregate, may be useful in interpreting the role of the faculty to the outside world or in interpreting one part of the university to another part. Such use would display the true "labor" of the academic world and would be a vast improvement over simplified reporting of teaching loads or contact hours. Faculty, themselves, are aware of the diverse activities in which they engage and the diverse tasks which surround and relate to a university position. To the uninitiated, even within universities, faculty may seem to enjoy a very "light" burden of assigned duties, a few hours of class and counseling during the week, with long periods left to one's own inclinations. Just as it was agreed that any data collection concerning academic/academic-professional personnel should be based on a sound philosophy of academic life, so it is here argued that the interpretation of academic life to those outside it and, even, to those within it, should proceed from an objectively correct analysis of academic life or activities. It is believed that the activity categories developed in this study provide a tool to project and concretize this interpretation.

Characteristics of Institutions

By the same token, reports based on these activity categories - taken not individually but in the aggregate - can be seen to reveal characteristics of departments, of schools, and of institutions. Reports from different departments and schools show marked differences in percentages of effort allocated to various activities. Although some of these characteristic differences are common knowledge (as, for example, that Engineering departments show more applied research than English departments), others may not be. In this study, one institution displayed a uniform emphasis on public service as an accepted activity of academic people. It is inferred that the reason for this lies in the public leadership of the president of that institution, and in the stated public service philosophy of the administration. Activities reports thus tended to show the permeation of this philosophy throughout the faculty.

The activities report would seem to be an instrument for discovering and describing characteristic emphases of departments and schools.

Evaluation of Individual Faculty Members

Much of the faculty criticism of and opposition to any activities report seems to arise from a fear that university administrators will use the data in the evaluation of individuals. Such use, of course, is neither politic nor justified. The activities report gives practically no clue as to the quality of the activities. Evaluation of the teaching or research done by an individual requires entirely different and more complicated procedures. Even if the quantified allocation of effort could provide some basis for evaluative judgment, the lack of precision already noted would make its use in individual cases highly suspect. Moreover, any suspicion of the possibility of such use would not only create faculty opposition, but would tend to distort further the allocation of effort since faculty would tend to compensate in their answers for potential "unfair" administrative action resulting from the request for activity data.

Hence, the activities report should not be used as an evaluative instrument in individual cases. This policy should be made clear to all those reporting.

Aggregate Reporting and the Identification of Trends

It has been recognized that faculty reporting of activities must be based on an estimate of effort allocated, so that mathematical precision cannot be expected. However, despite bias, carelessness, and subjectivity, an "estimated" allocation can be roughly correct. A limited amount of cross-checking done in this study supports this view. Also, in most actual reporting systems, an immediate superior (e.g., a departmental chairman) routinely reviews and countersigns the reports. There seems to be agreement that such a procedure renders the reporting more realistic and tends to eliminate the extremes of bias.

However, if, for psychological and political reasons, activities reports should not be used for the evaluation of individuals, there is no reason why they cannot be used, in the aggregate, for many impersonal purposes. Aggregates of allocation of effort, taken by departments, schools, institutions, regionally or nationally, can be used in significant and effective ways. Institutional and national trends can be discovered and their development followed. Many public assertions are made concerning teaching, research, and so forth, within universities. Such assertions could be easily tested if activities reporting, in conjunction with a complete academic personnel system, were in wide and regular use.

Allocation of Costs

One of the most difficult problems in a university cost study is the determination of a proper allocation of salaries. The usual budgeting procedures and controls of university accounting allow for allocation of salaries among established budgets. However, many program costs cannot be derived from conventional accounting systems.

The basic activity categories, presented previously, together with selected subcategories, provide a basis for many cost analysis studies in the area of salaries. Many administrators want to know what part of faculty salaries are attributable to research, to graduate education, and to other institutional programs. For example, the projection of new doctoral programs requires a determination of the additional "buried" salary cost. Thus, a wide variety of internal studies on personnel costs becomes feasible.

Other Studies

It should also be remembered that the type of activities reporting being proposed is part not only of a total system of academic personnel data, but of an integrated system of university information. If compatibility is maintained, many studies of relationships between the activities of academic people and other items of information become possible. For example, correlations can be made between the level of research activity and space usage, or library holdings, or various supporting services.

Activities Measurement in Computing Full-Time Equivalents

A special problem in the analysis of academic/academic-professional manpower involves the computing of full-time equivalents (FTE) of part-time people. In this case, the concept of the full professional life as the basic unit of measurement and the distribution of this unit among various activities in terms of percentage of effort have little applicability. However, the Project Group recognized that part-time personnel are a significant manpower resource, and limited study was made of ways of measuring their activities. Such measurement was found to be exceedingly complex, and it was possible only to identify selected elements of the problem and to explore several approaches to its solution.

In general, part-time personnel include any academic/academic-professional person who engages in the operations of an institution of higher education less than full-time. The definition of full-time varies among institutions, but, usually, part-time personnel do not have contracts with the institution calling for full-time teaching and/or research.

More specifically, the following categories of personnel are considered to be part-time: (1) graduate students assigned part-time to teaching or research and studying part-time toward an advanced degree, (2) persons engaged to teach a specific course or specific courses, and (3) persons under contract for a specified portion of full-time services.

Activities of Part-Time Personnel

A survey of part-time personnel at one of the universities in the Project Group revealed little mixture of activities for any individual.

Persons hired to teach did only this, and persons working only on research projects did not engage in other activities. The exceptions were usually graduate assistants who were involved in both teaching and research.

More specifically, it was found that part-time teachers confined their university-related activities to classroom instruction, preparation, and evaluation. Other subdivisions of teaching, such as counseling and advising students who were members of the class, were considered by the group surveyed to be minute aspects of their university-related activities and not significant enough to report.

The part-time research personnel surveyed, unlike the teachers, were not employed in full-time positions outside the institution, but were graduate assistants. For this group, research involved working in a laboratory or other research setting, collecting and analyzing data for a full-time faculty member who was the project director.

Very little diversity of activities for the entire group of respondents was revealed. Only three of the ten categories describing the full professional life were used by part-time personnel. These categories are Teaching, Research, and Formal Personal Education.

The sample survey, together with an analysis of the situation through discussions within the Project Group, suggests that part-time personnel are different from full-time personnel in the range of activities in which they engage (including subdivisions of the major categories of activities), as well as in the amount of time devoted to each activity. There is at least one important exception. Part-time personnel in professional schools (medicine, in particular) may take a much more active part in the wide range of activities found in the school. They may serve on committees, advise the administration, participate in decision-making, and engage in many other activities which are characteristic of full-time personnel. With this exception in mind, the tentative conclusion is offered that part-time personnel are not necessarily a miniature of full-time personnel, but may differ considerably in the variety of activities participated in as part of the manpower resources of an institution.

Methods of Computing Full-Time Equivalents

Four methods for determining FTE were explored, and they are offered here for such light as they may shed on the problem. Although pilot studies were conducted at two institutions, the results were not sufficiently conclusive to permit generalization. It should be stressed also that the following methods are to be considered only for computing FTE of part-time manpower.

1. Computation of FTE from Stated Contract Percent of Full-Time. For those part-time faculty members whose contracts or letters of appointment specify the percent of full-time for which they are employed, this method is very simple. It does, however, have the following defects: It can not be used for those engaged to teach a specified course; it does not take into account various services that some part-time people perform and so does not really assess the contributions of a wide variety of part-time staff members; it does not recognize that teaching effort may increase with increase in the number of students assigned to a teacher. This method merely says that an individual who is hired, for example, on the basis of 75 percent of full-time is .75 FTE, and that two such individuals would be 1.50 FTE.

2. *Computation of FTE from Percent of a Standard Number of Credits Taught and a Standard Research and Public Service Time*. This method requires that the institution have a policy as to the number of credits that constitute a full-time teaching program, the number of hours per week for full-time research, and the number of hours per week for full-time public service, each with due regard for other duties performed. It requires, also, a policy as to the equivalence of non-laboratory and laboratory class hours and the appropriate credits for each. With these policies established, the percent of a part-time staff member's time in any or all of these can be computed and then summed to give his full-time equivalency.

This method has the same defects as the first method. In addition, it may tend to overestimate the contributions made by part-time personnel to the total programs of the institution. For example, full-time faculty members carrying a standard full-time teaching load may report an average of 75 percent effort devoted to teaching. However, four part-time faculty members, each teaching one-fourth the number of credits that constitute a full-time teaching program, equal 100 percent of a full-time faculty member's effort, rather than 75 percent. What has been left out are the other activities engaged in by full-time faculty, but not by part-time faculty even on a reduced scale.

Another complication in this approach is that contributions of research personnel may be underestimated. Although their work is described as "half-time" or "quarter-time," based on the number of hours per week specified in their contracts or other agreements with the institution, these hour and part-time designations seem nominal. Because research is an activity that lends itself to irregular hours and improvised schedules, it is difficult to adhere to a rigid number of hours per week. Although half-time may mean 20 hours per week on paper, in actual practice it very often may turn out to be much more.

3. Computation of FTE by Choosing Several Activities and Reducing Them to an Equivalence with a Standard Teaching Program in Credits Per Week. Assuming a standard full-time teaching program in credits per week, say twelve, has been established, this method reduces the chosen activities to an equivalent part of the standard program. The summation of the percentages of the standard program for each activity gives the part-time person 's full-time equivalency in percent of a full-time program.

As an example of this method, a part-time faculty member may report that he teaches a 4-credit course, and, on the average, engages in Research for 12 clock hours and Teaching-Research for 8 clock hours per week. Then, assuming a 40-hour workweek and that 40 hours equal 12 credits, or that 3 1/3 work-hours equal one credit, his time spent on Research would equal 3.6 credits or 30 percent of a standard 12 credits, and on Teaching-Research, his time would equal 2.4 credits or 20 percent of the standard. These credits and percentages, plus his 4-credit course (33.3 percent), would equal 10 credits or 83.3 percent of full-time.

The disadvantages of this approach are the same as for the first method. Further, it requires a policy for the equivalence, in credits, of laboratory and non-laboratory classes.

4. Computation of FTE by Using an Activities Index. The use of a properly constructed activities index makes possible the computation of the full-time equivalency of a part-time faculty member in terms of the activities of a full-time faculty member. Such an index may be constructed to reflect the number of contact hours of teaching in class, in

consultation, and in laboratory or design; the number of preparations for different classes; the preparation time for classes in different level courses; the number of students in classes; the number of students being taught through research or through creative activities; various research or creative activities, if desired; intra-university and administrative duties; and public service activities.

Thus, indices may be formed for Teaching, for Teaching-Research and Teaching Through Creative Activity, for Research and Creative Activity in Art and Scholarship, for Public Service, or for other activities. These indices can be combined, as appropriate, to form an individual's activities index.[1]

Easily measurable quantities should be used for computing the indices. For Teaching, these are contact hours, credits, and number of students. For Teaching-Research and Teaching Through Creative Activity in Art and Scholarship, the number of students; and, say, a 40-hour week for Research, Creative Activity in Art and Scholarship, and Public Service. (Although clock hours are included as part of the activities index, it is by no means based upon time alone. Effort is included in several factors, and effort is, itself, partly based on time. Also, weights assigned to various factors attempt to add effort to time in computing the index.)

---

[1] Attempts to represent the activities of faculty members by a mathematical index or formula are not new. Several references are cited by Sam M. Lambert and David Iwamoto, "Teaching Load," in Chester W. Harris, editor, Encyclopedia of Educational Research, third edition (New York: McMillan Company, 1960), pp. 1496-1502. Among those relevant to higher education are: Luther H. Lyon, "A Plan for Evaluation of Teacher Load," California Journal of Secondary Education. 20:345-349, 1945; Frederick J. Kelly, "Relative Amounts of Time Required for Teaching Different College Courses," Journal of Educational Research. 13:273-283, 1926; Floyd Reeves and John Dale Russell, College Organization and Administration, (Indianapolis: Board of Education, Disciples of Christ, 1929) pp. 165-182. One, in particular, anticipated many of the factors developed in this Project: Leonard V. Koos, "The Adjustment of the Teaching Load in a University," Bulletin 1919, No. 15, Bureau of Education, Department of the Interior, 1919. All bear certain similarities to the activities index described here, although the intent of each is different. None of these attempts to depict the contribution of part-time academic and professional personnel or to develop an index for describing this resource.

The following are indices for several activities. For the meanings of the symbols, as well as explanatory notes concerning the index formulas, see Chapter 10 (Section IV).

For Teaching, including educational administration and Intra-University Activities

$$K = c + \sum_{i=1}^{k} w_i c_i + w_n \cdot n; \quad I_T = \frac{KT}{t}$$

For Teaching-Research, Teaching Through Creative Activity, and thesis direction

$$I_{T\text{-}R} = w_N \cdot N$$

For Research and Creative Activity, including their administration

$$I_R = L + P + C + A$$

For Public Service

$$I_S = S$$

The individual's activities index is

$$I = I_T + I_R + I_{T\text{-}R} + I_S$$

As mentioned previously, the index is intended to be used only to compute the FTE of part-time faculty members. Nevertheless, a norm, against which to compare the activities index of each part-time person, must be established. This norm can be obtained by computing the activities index of a sample of full-time faculty and the mean or median of all the indices can be used as a norm. In choosing the sample, full-time faculty members engaged in Teaching (including educational administration and Intra-University Activities) only, those engaged in both Teaching and Research, and those engaged in Teaching, Research, and Administration (e.g., department chairmen) should be used.

The activities index for each part-time faculty member can then be computed and the FTE of the individual can be determined from

$$\text{FTE} = \frac{I}{\text{Norm}} \quad (\text{or } \frac{I}{\text{Norm}} \times 100\text{, if percent is desired}).$$

The main disadvantage of this method is its complexity and the fact that it assumes a large amount of data to be available.

Computing Full-Time Equivalents in Different Types of Institutions

Full-time equivalence of part-time personnel is needed not only in such areas as architecture, engineering, humanities, management, science, and the arts, but also in dentistry, law, medicine, nursing, and social service. In the latter group, the services of part-time personnel, although described by the ten activity categories in Chapter 3, may be of such a nature as to raise a question of their method of use in obtaining FTE.

For example, in medical schools, the part-time staff may engage in any combination of the following activities: teaching formal classes, teaching through clinical service or through actual operations, performing clinical service not connected with teaching, doing research, directing thesis students, and the like. To include these services in computing FTE, it is necessary to allocate them in some way to the activity categories in Chapter 3. This can be done in the example here cited by allocating the teaching through clinical service or through operations to Teaching; clinical service not connected with teaching to Public Service; directing thesis students to Teaching-Research; and teaching formal classes and doing research to their respective categories.

Of the methods previously listed for computing FTE, the activities index seems best fitted for such schools because it is most closely related to the list of categories and can be made to fit the categories exactly by increasing the number of different indices and establishing a norm for each.

It appears entirely feasible to use an activities index to compute the FTE of part-time personnel in schools of dentistry, law, medicine, nursing, and social service. Likewise, it appears feasible to use an activities index for part-time personnel at such centers as agricultural experiment stations.

Recommendations

In view of the analysis of methods of activities measurement presented in this chapter, it is recommended:

1. That, at the analytical and philosophical level, the concept of effort as a method of measuring the activities of full-time academic/academic-professional personnel be accepted in principle; and that, at the practical level, further exploration be made of ways to implement the concept more effectively. Concurrently, additional studies of the concept's reliability, especially its gross and aggregate reliability, should be conducted.
2. That, on the basis of the difficulties described and the approaches suggested, further study be made of methods of pro-

perly computing part-time academic/academic-professional personnel in terms of full-time equivalents.

Summary

In the area of student data, considerable sophistication and uniformity has been achieved as a result of previous meetings. One of the groups contributing to this development is the American Association of Collegiate Registrars and Admissions Officers.

After the present investigation was initiated, the AACRAO group published a Handbook of Data and Definitions in Higher Education. In order to draw upon previous procedures and to avoid duplication of effort, it was decided to [illegible] into the total information system of the Project those concepts and definitions proposed in the student data area of the Handbook.

As a result of this effort, a slightly modified listing of minimum student data was developed, presented only in this chapter. This list is followed by an analysis of the AACRAO list of minimum student data. This analysis provides a rationale for the revised set of data elements of the Project Group. It is recommended that the revised listing be used as a basis for continued effort in resolving such problems as those of definition and retrieval of items in the area of student data.

CHAPTER 5

STUDENT DATA

SUMMARY

In the area of student data, considerable sophistication and uniformity has been achieved as a result of previous studies. One of the groups contributing to this development is the American Association of Collegiate Registrars and Admissions Officers.

After the present investigation was initiated, the AACRAO group published a Handbook of Data and Definitions in Higher Education. In order to draw upon previous experience and to avoid duplication of effort, it was decided to attempt to incorporate into the total information pattern of the Project those concepts and definitions proposed in the student data area of the Handbook.

As a result of this attempt, a slightly modified listing of minimum student data was developed. Presented early in this chapter, this list is followed by an analysis of the AACRAO items of minimum student data. This analysis provides a rationale for the revised set of data developed by the Project Group. It is recommended that the revised listing be used as a basis for continued effort in resolving such problems as those of definition and relationship of items in the area of student data.

The Centrality of Student Data

Although a member of the faculty occasionally is overheard suggesting that the institution would be a better place to work if there were no students, an educational institution without students is inconceivable. The rise of educational automatia - such as computer-based instruction, language laboratories, programmed materials, systems approaches to education, and other uses of the so-called media - make it possible to posit a higher educational institution without faculty. The existence of correspondence courses, extension teaching and open-circuit television make it possible to posit institutions where space and facilities are of no major concern. However, the type of information that most significantly describes any given college or university is information concerning its student body, both present and past.

The "size" of an institution, although perhaps reflected by certain financial data, by square or cubic footage measurements, or by the range of curricular offerings, is most commonly thought of in terms of the number of students enrolled (or some function thereof). The curricular emphasis of the institution may best be judged by the numbers of students, perhaps by level, enrolled in the various curricula, programs or majors offered by the institution, or by the numbers of students granted degrees in each of the several areas. Although the curriculum of a college or university may be described in terms of the courses available and taught, the programs of study advertised, and the interrelation of these two, a description of the curriculum in action - that is, the instructional program - is based upon the enrollment of students in sections and courses. As a final example of the centrality of student data, the "quality" of a college and university may validly be judged only in reference to the changes wrought in students and attributable to curricular, co-curricular, and extra-curricular programs of the institution.

Such data as referred to above are useful, even necessary, in many areas of decision-making and public information both within and among institutions. But the central utility of student data may perhaps best be seen in connection with the use of such data in conjunction with data of other types for analytic purposes. In the area of institutional planning, again both locally and nationally, most types of projections of required financial support, of space and facilities, and of faculty and other staff needs may be reasonably made only within the framework of student enrollment projections and by use of indices or ratios in which student data are a factor. Also the use of data in the analysis of the current operation of the institution requires student data in conjunction with data of other types. Included among analyses of these types are those of instructional costs, of the instructional productivity of instructional units, of teaching loads of faculty members, of the sizes of sections or classes, and of the enrollment in courses.

The preceding comments are made in order to emphasize the significance of student data in any system of information about institutions of higher education. A corollary of this significance is that the area of student data, of the categories thereof, and of the definitions of terms involved, has been the subject of much discussion and study. No college or university can continue to operate unless student records are maintained. This means that each institution must have made certain decisions about how these data are maintained. At the inter-institutional level, questionnaires requesting data on students are numerous, and for many of these questionnaires much thought has been involved in the development of categories and definitions. Yet to date there is available no single comprehensive categorization of types of student data that is completely acceptable to large numbers of institutions, nor is there a complete agreement on the definition of terms in the student data area.

Previous Studies and Present Objectives

Early in the over-all investigation, the Project Group became aware that the American Association of Collegiate Registrars and Admissions Officers (AACRAO), through its Committee on Data and Definitions in Higher Education, was preparing a revision and expansion of an earlier publication of the association, A Glossary of Terms Used by Registrars and Admissions Officers.[1] The work of the AACRAO Committee was published as a Handbook of Data and Definitions in Higher Education in 1962.

The AACRAO Committee concentrated its work in the student data area; therefore, in order to draw upon its experience and to avoid duplication of effort, the Project Group decided to attempt to incorporate the concepts and definitions proposed by the Committee into the framework of the Project. The purpose of this chapter is to present a list of minimum student data that will be as compatible as possible with both the AACRAO handbook and the total information pattern developed by the Project Group.[2]

---

[1] By Robert E. Mahn, 1956.

[2] Grateful acknowledgment is made to James K. Hitt, formerly Chairman, Committee on Data and Definitions in Higher Education, and currently, President, American Association of Collegiate Registrars and Admissions Officers, for permission to quote from pp. 22-24 of the Handbook of Data and Definitions in Higher Education.

Uses of Student Data

A fundamental consideration in the review of categories and definitions of student data has been the uses that are, can be, or should be made of such data. Ideally, the specification of categories of data that should be maintained and definitions that should be observed would be derived from a catalog of potential uses for the data. No such catalog of uses for data of sufficient specificity for this ideal approach to be followed is now available. The development of such a catalog, although a worthwhile undertaking, was viewed as too great a task to be undertaken as part of the present effort.

Nevertheless, the point of view adopted here is that categories and definitions of student data must be justified on the basis of their potential utility. To this end, a broad outline of the potential uses of student data was developed and has been helpful to the work in the student data area herein reported. In this categorization, a distinction between internal and external uses of data is made. Data may be used in the internal management, evaluation and planning of a single institution or may be reported by the institution to some external agency for use in concert with comparable data from other institutions.

Internal Uses

Several broad types of uses of student data within an institution should be noted.

1. To Administer Policies. Each college or university has certain policies which can be administered only by reference to data on students. Individual student records are necessary if policies on degree requirements are to be enforced. The ages of students must be available if housing policies are differentiated on the basis of this characteristic. Activities in the day-to-day operation of the institution similarly re-

quire student data.

2. To Project Needs. Almost any projection of resources needed in the future by an institution will depend upon a baseline projection of some function of student enrollment. This statement holds whether the projection deals with financial support, academic and professional manpower, or physical facilities. In order to project the student population or sub-groups of this population it is necessary to have available not only current but also past measures of this population in order that trends may be observed.

3. To Facilitate Management. Many of the decisions required in the current operation of a college or university may be intelligently made only by reference to student data. The development of a budget for a department may reasonably depend, in part, upon the number of students enrolled in the department and some function of the numbers taught by the faculty of the department. The implementation of a new course in mathematics required for business majors requires that the number of business majors be known. Any consideration given to the development of a new program must involve some estimate of the potential student demand for it.

4. To Plan Student Academic Programs. The advising of individual students with regard to their academic programs is facilitated by data concerning the student as well as normative data on some larger group of students. The normative data, such as test scores or grades, assist in interpreting the data for the student being advised.

5. To Inform the Public. A college or university uses student data for public relations purposes in a variety of ways. Certain types of information describing the university are issued by the institution in press releases or in public appearances by officials of the institu-

tion. External agencies, such as news media, often request information on students for, essentially, public information purposes.

6. To Evaluate Programs. The success of a college or university may reasonably be judged only on the basis of changes in students in relation to the objectives or purposes of the institution. Hence, in the broad area of evaluation which will generally involve occasional, as opposed to periodic, assembling of information, data on students are central. Analyses of this type include studies of objectives and purposes, of student characteristics, of students' attitudes and motivations, of "campus cultures," and of changes in student behavior, broadly conceived.

7. To Serve Individual Students. The activities of deans of students' offices, of placement services, of financial aids offices, and of alumni relations offices, for example, require data on the individual students they serve. However, the unique types of data required for these activities receive little attention in this chapter; these uses, probably more than the others, are peculiar to individual institutions and to the individual activities within institutions serving the several functions and for this reason may be considered of secondary importance in a general analysis of the type undertaken here.

External Uses

As implied above, it is convenient to distinguish "public relations" uses of student data from those uses by external agencies which have a primary concern with higher education and which use composite data from several institutions in performing their functions. Included among such external agencies are the United States Office of Education, the National Science Foundation, the National Institutes of Health, state government agencies, regional associations of higher institutions, professional organizations, and foundations. Four types of uses of student data by such external agencies should be mentioned.

1. To Develop Public Policies. Student data enable analyses of trends in the contributions of higher education to the manpower resources and economic growth of the nation or region to be made. Such analyses are useful in developing public support for higher education as a whole and for particular disciplines that appear to be in short supply.

2. To Plan Programs. Data on students enable state, regional, and national agencies to plan programs of support for higher education. Manpower planning is dependent upon student enrollment data by discipline and level. With such data, predictions of available manpower in various fields may be made. National or statewide shortages may be met by planning and supporting specific programs.

3. To Administer Programs. Various types of student data are required by external agencies in the administration of their programs. For example, attendance records are requested by the Veterans Administration in their program of subsistence payments to students.

4. To Inform the Public. Some compilations of student data are used for public information purposes. The various mass media pick up and report the result of surveys conducted. The involved data then play a role in shaping public opinion concerning higher education.

Data and Reports

It has been helpful in considering student data to conceptualize several levels of data and reports on students. The categories described here could apply to any type of data, but they have been applied here specifically to student data.

1. Raw Data. Discrete items of information are raw data. The age, class level, and major of a student, and the set of courses in which he is enrolled at a given point in time are examples of raw data. Any use to which data are put is dependent upon the existence of accurate and complete raw data.

2. Operating Reports. When raw data are exhibited in some organized format, an operating report results. Such reports are usually listings or enumerations. They are here called operating reports because their chief use, other than as a record or historical document, is in the day-to-day operation and management of the institution. Class rosters or lists, transcripts, and similar documents are examples of operating reports of student data.

3. Statistical Reports. When raw data are summarized and displayed in tabular form, the result is a statistical report. Enrollment reports and various other presentations of counts of students are examples of descriptive statistical reports, as are tables presenting sums, averages, percentages, or percentiles for various types of data. The distinction between operating and statistical reports is that statistical reports, in being compilations, may have informational value and utility beyond that of the (operating) listings upon which they are based.

4. Analytical Reports. Analytical reports involve explanation or analysis and interpretation of data. Such a report may be an interpretation of an existing statistical report or it may involve a new arrangement and statistical manipulation of raw data in order to achieve some specific aim, to answer some specific question, or to shed light on some problem.

These four categories may prove useful as attempts to define the types of student data that an institution must maintain, that is, to define minimum essential student data. An institution must maintain those items of raw student data which are required for the development of the operating and statistical reports necessary for the routine management of the institution. As a general rule, analytical reports are the result of occasional studies of students, for which data will sometimes be available. However, the general rule is that special types of data will be required for such studies and must be specially collected. Even if it were possible to foresee the types of data required in the pursuance of such studies, it would be uneconomical to attempt to maintain them on a routine basis.

Procedure

In the analysis of the AACRAO concepts and definitions, two general guidelines were used, in addition to those previously implied under "Uses of Student Data" and "Data and Reports."

The first of these is the potential utility of the data, particularly with respect to the preparation of operating reports made necessary on the basis of established policies and procedures. Thus, if the application of a policy is dependent upon a particular element of data, that element must be maintained. Conversely, if an element of data is not required in some similar manner, its inclusion as a minimum essential may be open to question.

The second guideline is the need for student data to relate to data in other areas of the Project. Where possible, student data should be defined and maintained in a manner that is compatible with data in the areas of manpower, facilities, finance, and curriculum. An overriding thesis of the present report is that the utility of institutional data is largely proportional to the degree to which there exists a coordination among the several areas in which data are maintained.

Both the elements of data and their organization were analyzed, and a slightly modified listing was then developed. This revised set of data, although based largely upon the Handbook listing, may be considered to be the minimum student data recommendations of the Project. These data are presented in the next section of this chapter, after which there is a discussion of the original AACRAO list. This discussion gives the reasons for such modifications as were made, and, in general, provides a rationale for the listing recommended by the Project.

Minimum Student Data Recommended by the Project

Below are listed the minimum essential items of student data which resulted from the analysis of the student data area of the Handbook.

In the Handbook, student data are organized into four basic categories, as follows: (1) personal data, (2) historical-educational data, (3) current educational program of the student, and (4) future plans of the student. In the present list, all data items are placed in the first three categories; data items that were in the fourth category of the Handbook listing were either deleted or relocated.

The present categories reflect the content of the data. An alternative method of organizing the items, on the basis of "stability," would perhaps be more useful in the development of procedures for collecting, storing, and reporting student data. Identification number, date and place of birth, and sex are items which are permanent and may be recorded on this basis. Name, marital status, and veteran-benefit status may be expected to change less frequently than every term, and methods for handling these types of data can be based upon this fact. Local address and type of institutional financial support may be expected to change with sufficient frequency that, perhaps, this information should be collected on all students every school term or semester.

If an item listed here is taken directly from the Handbook, the notation "See Handbook" appears in the "remarks" column; in general, meanings of such items may be found in the discussion of the AACRAO list later in this chapter. If a revision in the meaning attached to the item is suggested, this is explained under "remarks." A new or greatly revised item is indicated by an asterisk beside the item number, and a brief explanation is given in the "remarks" column.

Data		Remarks
1.	Personal Data	
*1.1	Identification number	Social security or other permanent identification number
1.2	Name	(See Handbook)
1.3	Date of Birth	(See Handbook)
1.4	Sex	(See Handbook)
1.5	Marital Status	Single or married
1.6	Geographic origin	(See Handbook) Also include home address.
1.7	Official domicile	(See discussion under "Residence" later in this chapter.)
1.8	Local address	(See Handbook)
1.9	Veteran-benefit status	(See Handbook)
*1.10	Type of institutional financial support	Scholarships, fellowships, loan, and employment by institution as hourly worker, graduate assistant, faculty, etc.

2. Historical-Educational Data

2.1	Institutions previously attended	(See Handbook)
2.2	Previous degrees and/or certificates	(Self-explanatory)
2.3	Amount of advanced standing credit	(See Handbook and discussion of item later in this chapter.)
2.4	Measures of secondary school success	(See Handbook)
2.5	Ability test scores	Scores, and appropriate percentiles, on admissions, local orientation, and placement tests

3. Current Educational Program Data

3.1	When, where, and how work is taken	(See Handbook)
3.2	"Segment" of the spectrum of education beyond high school	(See Handbook)
3.3	Administrative subdivision to which student is assigned	(See Handbook) Exclude curriculum.
3.4	Curriculum and/or major(s)	(See definitions in Handbook Glossary, p.53 and p.83, and discussion of second item under "Future Plans of the Student," later in this chapter.)
3.5	Degree or certificate toward which student is working	(See Handbook) Also identify candidates for teaching certificates. Projected date needed only if it is current term.
*3.6	Educational level	The general level of the degree or certificate sought; may be described in terms of (a) number of years of college prerequisite to the program and (b) length of program.

3.7 Year level	The number of "years" plus one of college work completed in progress toward a degree or certificate (Alternatively, the year level may be determined as indicating progress through a given educational level.)
*3.8 Courses in which registered	Department, number, title, credit values, and other appropriate designations of courses in which enrolled during current term or semester.
3.9 Load measures	Total credits for which registered, including credit equivalents (Full-time or part time). (Sums of credit for which registered may, if necessary, be converted to full-time-equivalents for enrollment count purposes.)
3.10 Quality of work being done by the student	Quarter or semester and cumulative grade-point average. Listing by term of courses for which student has registered at the institution, including grades; the common "permanent record" data.

Minimum Student Data, AACRAO Handbook

In this section, the entries (both data items and remarks) in the AACRAO listing of minimum student data are quoted from pages 22-24 of the Handbook. Individual page references are not given. An introductory remark in the Handbook listing indicates that "material enclosed within parentheses is considered to be optional, desirable in many instances, but not absolutely required." The discussion that follows selected entries provides a rationale for the revised listing recommended by the Project.

Personal Data

1. Name	Full legal name - normally that contained on birth certificate. A change in name may result from marriage, court order, or other recognized means. If changed after initial admission, the original and new name are cross referenced.

In addition to name, it is recommended that the student's social security number be considered to be a minimum essential item. The use of a permanent identification number for individuals is almost essential where records are maintained in punched cards or on magnetic tape, and may also facilitate the keeping of records by hand. A permanent matriculation number or alphabetical serial number may also be considered.

2. Date of birth	Month, day, and year of birth. (Place of birth.)
3. Sex	Male or female.
4. Marital status	Single or married. (Divorced.) If married, specify if married to another enrolled student. (Also, if married, number of children.)

The three preceding elements of data are basic. Although "place of birth" may be justified as an unchanging datum useful for identification purposes, it is suggested that "divorced" and "number of children" should generally not be on the minimum data list and that the necessity of recording whether a student's spouse is also a student may be questioned. Unless there exists a special institutional policy for which this information needs to be available, it would not appear to belong in the minimum essential category.

5. Geographic origin	Home town, county, state, or country. In general, this means the location in which the student resided immediately prior to his initial registration at an institution, or in which his parents are presently domiciled.

Geographic origin should not be confused with "legal residence" or "domicile" (see below) which is used in public institutions for fee assessment purposes. If the institution sends grade reports to parents and defines geographic origin as the location in which the student resided immediately prior to his initial registration, it may be necessary to maintain "parents'"or "home address" in addition to "geographic origin."

6. Veteran-benefit status	Public law under which student is receiving educational benefits.

This information will continue to be needed for the administration of these benefits as long as they are available.

7. Residence	Resident or non-resident. Needed by public institutions for fee assessment. Refer to Domicile. Not to be confused with resident in its meaning of "living on campus." See 8.

The classification of students as "in-state" or "out-of-state" is a significant matter in those institutions with differential fee and tuition charges for the two types of students and the "residence" designation of a student may not necessarily correspond to his "geographic origin." The Glossary section of the Handbook contains a thorough definition of "Domicile" and an extended discussion of "Domicile, Principles and Practices of."[3] However, this classification of students is of internal concern only. For this reason, there is no appreciable need for a standardized definition or specification of practices concerning the matter of domicile.

8. Local address	Where student lives while attending school. With parents, with relatives, in a rented room in a private

---

[3] AACRAO Handbook, pp. 60-61.

	home, in an apartment, fraternity or sorority, or dormitory. Commuting or living near the campus. Living in institutional or privately owned housing.
9. Sources of financial support	Scholarship, loan, part-time job, earnings, savings, family, relatives, and so forth.

It would appear to be difficult to justify the systematic maintenance of this type of classification of economic data on the basis of need in the administration of policies. Periodic special studies of student economics may be of value to the institution, but it should be possible to collect this type of information - and it will need to be more detailed than indicated here - on the occasion of the special study.

It is recommended that for this item of data there be substituted one of "type of institutional financial support." Here would be recorded data on scholarships, fellowships, loans, and employment at the institution. It is suggested that a basic file of student data may contain indications of the "presence" or "absence" of these several types of institutional financial support, and the details of the information may be maintained in the institution's financial or other data files.

Historical-Educational Data

1. Institutions previously attended	Last secondary school and all colleges and/or universities attended, with dates of attendance. Date of last attendance at current institution.
2. Amount of advanced standing credit	For previous college work or advanced placement examination: a. accepted as successfully completed; (b. allowed toward present educational objective).

Both categories of advanced standing credit must be recorded and must be considered as the student's progress towards a degree is certified. The parentheses around "b." should be removed, since the item should be considered required, not merely desirable.

3.	Previous degrees and/or certificates	
4.	Measure of secondary school success	Rank in class. Grade-point average. Recommendation of principal.
5.	Scores on standardized tests	Description of tests, norms, date of administration.

Current Educational Program of the Student

1.	Administrative subdivision to which student is assigned	College, school, division, department, or curriculum.

This item appears to refer to the administrative unit in which the student's faculty adviser is located or to that which is more closely related to the student's major field of study. The appearance of "curriculum" in the remarks tends to confuse this meaning. The student's curriculum refers to the program of courses or experiences he is following. There is not, therefore, necessarily a one-to-one relationship between the department to which the student is assigned and the curriculum he is following. It is usually important to maintain both. The former provides a basis for estimating the load of student advising carried by the faculty of an administrative unit and the latter is used to describe the composition of the student population in terms of curricular emphases and in projecting graduates by subject area.

2.	When, where, and how work is taken	Semester, trimester, quarter, summer session, term, session; program of current enrollment. Main campus, branch campus, extension center, day classes, night classes, co-operative plan, correspondence or home study, foreign study programs, radio or television, special examination, and so forth.
3.	"Year level" of the student	Freshman, sophomore, junior, senior, or first year, second year, third year, fourth year, fifth year, etc.

	Should show as nearly as possible, to the nearest year, the relative position in which a student is located in his curriculum (see discussion in the Glossary under Year Level).
4. "Educational level" (this may derive from 1 and 3)	Undergraduate, lower division, upper division, graduate, professional, advanced professional, certificate, post-doctoral, post-graduate.

It is important to remember that the two types of categorization, immediately preceding, are not exactly the same and that the purpose for which the information is needed will determine the one to use. "Year Level, Student" is rather thoroughly discussed in the Handbook Glossary and is intended to represent generally the number of "years" of full-time-equivalent progress towards a degree that has been accomplished by the student.[4] "Educational level" is not, however, an entry in the Glossary, but refers to the level of the program or degree being pursued. The common bachelor's degree program for four, occasionally five, "years" is pursued by students at the "undergraduate" educational level. It is often desirable to distinguish lower division from upper division undergraduate students. Some professional programs may be four years in length and require for admission the equivalent of two years of college work. Thus, a "third-year" student may be in his "first-year" of a professional program. It is such situations as this that require the distinction between year level and educational level and also require careful definition of the two.

It is suggested that "educational level" be described in terms of (a) the number of "years" of college level work typically required for entrance into the program and (b) the number of "years" typically required for its completion. It is recognized that the concept of "years" is an imprecise one, particularly with regards to lapsed time. However, as a more-or-less abstract measure of amount of academic experience completed, it is a conventional and easily interpreted measure.

---

[4] AACRAO Handbook, pp. 129-130.

"Year level" may then be used either in conjunction with or independent of "educational level." Thus, a student in the "first year" of a professional program in, say, veterinary medicine, may be in his "third year" of college work. The choice in method may be based upon local convenience or usefulness because one may be easily converted into the other.

5.	"Segment" of the spectrum of education beyond high school. (The institution itself may operate in more than one of these; if so, students should be identified separately in each segment as well as totally.) This may overlap with 1 and 4.	University, college, professional school, graduate school, technical institute, junior college, trade school, vocational school, continuation study, adult education, terminal program, and so forth.
6.	Amount of load carried by the student	Semester hours, quarter hours, contact hours, courses.
7.	Full-time versus part-time	Normally derived from "load," 6, above. Precise definition, although arbitrary and subject to considerable disagreement, can be made from careful choice of fundamental data.

In addition to the data suggested for the two preceding items (6 and 7), the specific courses and, probably, the sections in which the student is currently enrolled, must be recorded. The student's load may then be derived from the record of courses in which enrolled and the designation of full- or part-time can usually be made from the load data in conjunction with appropriate level information.

Student loads are usually measured by the academic credit value of the courses in which the students are registered. The Handbook uses the terms "semester hours" or "quarter hours" in describing measures of load in terms of academic credits and "contact hours" in describing the actual hours per week classes meet. On the basis that the credit values of courses are not always equivalent to the hours per week they meet and that the use of the word "hours" in both terms is confusing, it is recommended that the terms "semester credits" and "quarter credits" or, more simply, "credits" be used and that the terms "semester hours" and "quarter hours" be abandoned.

It further suggested that many colleges and universities need to give consideration to assigning "credit equivalents" to certain experiences required of students in degree programs, but not customarily administered in the same manner as "courses." For example, certain graduate programs contain the requirement that the candidate teach one undergraduate course one semester (with or without pay) or take part in some other on-the-job or internship experience. In order that the student's load in meeting academic requirements be meaningfully estimated, and that the service of the institution to students be reflected, it is necessary to assign or impute a credit value to such activities.

If the load carried by students is measured by the credit value of the courses or other experience in which they are engaged, the service load of the institution may be measured by the same credits. A sum of credits over students (or, what is the same thing, over courses) is referred to as "student credit hours" or, preferably, "student credits." Thus, the total number of credits or student credits for which students are registered may be suggested as the most meaningful indication of student or institutional load. In this connection, it may be noted that the student credits carried by students in a given course is the product of the credit value of the course and the number of students registered in the course, and that the sum of student credits over courses is the same as the sum of credits over students.

The traditional methods of measuring institutional load or enrollment include (a) counting the number of different students, (b) counting the number of different full-time and part-time students and (c) counting the number of full-time-equivalent students. The obvious weaknesses of method (a) are corrected, in part, by method (b), but it is still true that some groups of part-time students carry more academic work than other groups. Method (c) is preferable to (a) or (b) because it provides a more complete correction for variation in loads of individual students. Methods of calculating numbers of full-time-equivalent students may be refined so that different procedures or formulas are used for students in various programs which may differ in expected duration or total credits required.

The full-time-equivalent student is a derived measure which is based upon totals of student credits. For this reason, it is recommended that, where possible, the original student-credits measurement be used as the basic measure of instructional service or load. The student-credits measure is extremely flexible and adaptable to many types of statistical analyses of institutional operations. It may be proposed that questionnairing agencies consider requesting enrollment figures in the form of total student-credits rather than - or in addition to - head-counts, full- and part-time counts, or full-time equivalent counts. Consideration given to this suggestion must recognize that there are some differences among institutions in the manner in which course credits are assigned and in average or expected student loads. This factor may reduce the comparability of institutional totals of student credits.

"Student-class-hours" or "student-contact-hours" have been suggested as the appropriate units for measuring institutional load. The basic argument is that the credit is an abstraction with regard to both student and faculty time and effort. The more-convincing counter-argument is that the credit is the basic unit of currency in moving the student towards a degree. It is, therefore, designed as a measure, admittedly imperfect, of student attainment and may be meaningfully associated with any academic experience, including independent study, supervised research, internships, and regular classroom course work. As such a fundamental unit, it seems appropriate to use the credit in reporting and investigating various matters of institutional operation. One exception is that in the analysis of the utilization of classroom space, the number of hours per week that a room is scheduled and the total number of student-class-hours that are scheduled are basic data.

8. Quality of work being done by the student	Cumulative grade-point average, rank in class; yearly or overall.

This element of data, particularly the cumulative grade-point average, is clearly needed in certifying the student's progress towards a degree. The rank-in-class datum is a derived one which is subject to misinterpretation on several counts. The chief problem lies in the specification of the reference group and the difficulty of interpretation associated with varying reference groups. An additional point regarding this item is that the complete record of courses completed, the "permanent record," must also be accurately maintained.

Future Plans of the Student

1. Degree or certificate toward which the student is working and	This is to assist in differentiating between regular and special or unclassified or non-matricu-

when he expects to get it	lated students. The projected date of graduation may assist in clarifying "year level."

It is clearly necessary to record the degree or certificate toward which the student is working, or the fact that he is working towards none. There should be a close relationship among (a) major field, (b) educational level, and (c) degree or certificate for which registered. Educational level should be completely specified by the degree for which the student is registered and his major field. It is questionable whether it is necessary to call "degree for which registered" a future plan of the student. It is a characteristic of his current program. It is also questionable whether the projected date of graduation is necessary. Clearly, the student must indicate during his final term his intention to receive a degree in order that his program be certified. The utility of a projected graduation date for all degree candidates is, however, unclear.

By means of longitudinal investigations of student populations, individual institutions may develop historical, statistical data on the numbers and percentages of students that may be expected to complete their programs in given numbers of semesters, quarters, or years. The application of such statistical knowledge to currently enrolled students may be expected to yield considerably more accurate projections of enrollments and of the flow of graduates into specified fields than could be derived from the use of a "projected date of graduation."

2. Intended (or present) major (or majors)	Not necessarily the same as curriculum; may be multiple.

The student's present major field of study is an essential item of data. In institutions in which lower division students are not enrolled in a specific major field, it may be desirable to record their intended major, if known. The terms "curriculum" and "major field of study" are defined in the Glossary.[5] In general, "curriculum" is the more inclusive term, "major" the more specific; a curriculum may consist of a family of specific majors. If the student's "major field" is a matter of record, his "curriculum" may be derived from it and hence, need not be specifically recorded. Again, it is questionable whether it is necessary to classify the element as an aspect of the student's future plans. It is a characteristic of his present program.

A special situation exists in the case of students who are preparing to teach in specific subject matter areas. Practice in the specification of major field for such students has not been consistent. On the basis that their programs are largely parallel to those of departmental major students, it can be recommended that such students be considered to have the subject matter area as their major field, whether for administrative or advising purposes they are assigned to the education department or to the subject matter department. With respect to (1) above, it will be necessary to record that the student is a candidate for a teaching certificate.

3. Plans for further study (professional or graduate)	May differ from major and curriculum; may even be pure speculation.
4. Intended Vocation	

The inclusion of these two items in a list of essential data is open to question. They are not needed for any specific purpose on a continuing basis. They may be required from time to time in special studies of students and related matters, but the most reasonable point of view is that these data should be collected when needed and not main-

---

[5] AACRAO Handbook, p. 53 and p. 83.

tained in a systematic fashion.

Recommendations

The AACRAO Handbook has made a significant contribution toward the development of uniformity in meanings of terms in the student data area, and it is hoped that the present chapter will add, in some degree, to this development. However, continued effort will be needed before such problems as those of definition and relationship of items in this area will approach resolution.

A list of minimum student data which resulted from the analysis of the student data area of the AACRAO Handbook was presented earlier in this chapter. It is recommended that this list be used as a basis for continued effort.

CHAPTER 6

FACILITIES DATA

SUMMARY

Since a strong relationship exists between building space data and equipment data, these two areas are subsumed under "Facilities Data."

Concerning the first area, the problem of evaluating building space in colleges and universities is examined in terms of both the inventory of physical space and the analysis of room utilization. The inventory provides an overview of space on a campus and gives perspective to utilization studies of such space. An orientation for the inventory of nonresidencial and residential building space is given in this chapter, as a basis for implementing the inventory through the use of forms and instructions and other supplementary materials that are provided in Chapter 11. A recommendation is made to the effect that the building space inventory system and the measures of classroom utilization be considered in any development of a national system of reporting facilities data.

Regarding the second area, the problem of how best to approach the inventory of equipment, especially movable equipment, is examined in terms of concepts, definitions, objectives, and data requirements. This examination provides a basis for implementing an inventory system using appropriate techniques which are described in Chapter 12. It is recommended that colleges and universities adapt to their particular needs the definitions of equipment and the delineation of objectives and related data requirements, where needed, in the design and implementation of equipment inventory systems.

The investigation of physical facilities data focused upon the inventory of nonresidential and residential building space, including the analysis of nonresidential rooms; the utilization of instructional space; and the inventory of movable and fixed equipment. Published studies of methods of evaluating building space were reviewed, as well as numerous general references on this subject.[1] However, the literature devoted to equipment inventory systems for colleges and universities was found to be practically nonexistent. The strong relationship between building space data and equipment data was recognized, and the two areas became subsumed under the general heading of "Facilities Data." It was also recognized that the process of inventory was a prerequisite to any study of utilization.

Purposes of Space Inventory Data

The data which result from a campus space inventory serve several purposes, not all of which are mutually exclusive: (1) to describe, quantitatively and qualitatively, the space that exists; (2) to report the way in which the space is being used; (3) to provide a basis for assigning space appropriate to the organizational units within an institution; (4) to provide information relevant to the appropriateness of converting a given unit of space from one use to another; (5) to provide a baseline for projected long-range needs; (6) to plan operating and capital budget requests; (7) to make interinstitutional comparisons; and (8) to interpret present and future needs for space to the general public and other interested groups or persons. In brief, these data are intended to serve a useful purpose in making decisions of immediate and long-range interest to the college or university.

---

[1] It is not possible to acknowledge all sources of ideas gained over a long period of time. However, the following publications are representative of the many source documents used in the preparation of the materials on methods of space inventory and studies of space utilization, as presented in this chapter and in Chapter 11: *California and Western Conference Cost and Statistical Study*. New York: Fund for the Advancement of Education, 1960; Jamrich, John X. and Ruth Weinstock. *To Build or Not to Build*: A Report on the Utilization and Planning of Instructional Facilities in Small Colleges. New York: Educational Facilities Laboratories, Inc., 1962; Jones, Donald A. *Physical Facilities Analysis for Colleges and Universities*. Oneonta, N. Y.: American Association of Colleges for Teacher Education, 1958; *A Master Plan for Higher Education in California, 1960-1975*. Sacramento: California State Department of Education, 1960; Russell, John Dale and James I. Doi. *Manual for Studies of Space Utilization in Colleges and Universities*. Athens, O.: American Association of Collegiate Registrars and Admissions Officers, 1957. Also: Dahnke, Harold L. "Some Random Thoughts on Space Utilization," *College and University*, Vol. 36 (Fall 1960); and Zanfino, Frank J. "How Many Students Can Your College Accommodate?" *College and University Business*, Vol. 34 (May 1963). (For a more complete listing of references, see U. S. Department of Health, Education, and Welfare, Office of Education, OE-51004-12A: *Space Utilization Bibliography*, January 1964.)

During recent years increasing interest has been focused on one aspect of the educational physical plant: classrooms and their utilization. One of the advantages of a total physical plant inventory is to give perspective to such utilization studies. Contrary to the popular image, college and university buildings consist of more than classrooms and teaching laboratories; there are also faculty offices, libraries, research laboratories, power plants, shops, workrooms, and various supporting service areas. One study suggests "that even when residential buildings were excluded, the instructional rooms accounted for no more than 38 percent, and for as little as 14 percent of the total (nonresidential) building space."[2]

Benefits to be derived from complete use of facilities appear to be both known and desired by college and university administrators;

---

[2] California and Western Conference Cost and Statistical Study, p. 58.

however, the means by which these aims may be obtained are not so well known. The making of an inventory of the campus building space is the initial step toward a careful evaluation of the utilization of that space.

Understanding the Building Space Inventory

A building space inventory is an organized procedure, the purpose of which is to assemble and maintain quantitative and nonquantitative information concerning usage of space in buildings. Such an overview of space on a campus should include collection of existing data, observation of actual spaces, analysis and appraisal of the observations, and recording of the results of the analysis.

Subsequent to the inventory, evaluation of the results (by comparison with a standard of measure) and action founded on knowledge obtained from the endeavor will hopefully occur. Critical analysis is an inseparable part of such a survey.

In addition to the area and volumetric data obtained from a space inventory, there is a wealth of usable information produced which concerns the less tangible but equally important characteristics of space, namely, the quality or condition, the nature or design properties, and the present usage of rooms and buildings.

Quantity of Space

A thorough inventory produces a numerical measurement of floor space, and it allows analysis of the adequacy of such space for either its intended or its projected purpose. Adequacy is an illusive quality, and an analysis of it demands judgment from both the surveyor[3] and from persons responsible for assignment of space.

Floor area, for example, is not a valid measure of adequacy. Of two rooms with equal floor areas but with different shapes, one will be more usable for a particular function than will the other. To illustrate: the flexibility of seating arrangement in a square room of 400 square feet is greater than that in a long rectangular room of the same area. Thus, for purposes of space analysis, quantity must be supplemented by judgments of quality.

Quality of Space

To aid the surveyor's approach in organizing the inventory, it is convenient to think of quality as being synonymous with the physical condition of the room or building at the time that the inventory is made. Physical condition refers principally to state of repair, appearance, and comfort. Observation of these conditions can assist those responsible for maintenance of buildings.

Quality of architectural volume includes such considerations as permanence or nonpermanence of the structure containing it: the visual, acoustical, and thermal properties of a room; proximity to other facilities; safety and convenience; and, sometimes, local significance or history relating to the building. Many questions which arise from such considerations are subjective and require perceptive, and often local evaluations before answers can be formulated. Such questions are fundamentally beyond the scope of a basic inventory as described here and in Chapter 11. Again, it becomes necessary to limit the concept of the surveyor's inquiry to the more usable and observable aspects of quality.

---

[3] The term "surveyor" is used to refer to any or all persons involved in performing a building space inventory regardless of their specific contribution.

Nature of Space

The nature of a space refers to its inherent character. This character is a product of the design decisions made originally by the architect, and, subsequently, by others who saw reason to modify the space for the same or different usage. Whatever form the resulting space may have come to possess, it presumably exists at the time of inventory in a state of some usefulness for college or university functions. The surveyor must seek to appraise and classify an architectural volume according to its peculiar attributes or suitability for its current or proposed usage.

Simple though such a process may appear, difficulties arise when spaces, other than such "single-functional" spaces as auditoria with fixed seating, natatoria, foyers, or lobbies, are considered. For instance, some classroom space is well suited for instruction involving recitation or discussion, but less suitable for instruction involving demonstration or the use of audio-visual aids. A particular laboratory space may be adequate for instruction, but inadequate for basic research. These comparisons involve only slightly dissimilar functions; however, in day-to-day practice, such spaces are often required to be usable for more diverse functions. Judgment is required in establishing the preferred performance for a room or building.

Just as a limitation of convenience was placed upon the meaning of quantity and quality of space, one must admit, when preparing to survey a campus, that to know every space in exhaustive detail is to have personally experienced every space: an unreasonable possibility, if not an impossibility. Consequently, a basic inventory must have reasonable and specific confines. The basic items of information to be recorded will be found in the forms presented in Chapter 11.

Accomplishing the Building Space Inventory[4]

Three precautions deserve mention. First, a careful local study should be made to ascertain problems and situations which may require modifications in the system proposed in this report. Specifically, a pilot study of one or more buildings to test out procedures, personnel, and forms should be made before commitment to a full-scale program Second, it is important to have frequent coordinating meetings of all personnel involved in space inventory work so that inconsistencies in interpretation may be discovered and reconciled before they become widespread. Third, a responsible person should be readily and regularly available to make necessary procedural decisions as the work progresses.

Classification of Space

For purposes of the inventory, all campus building spaces may be placed in one of two categories: nonresidential and residential - a broad but useful division. Within these two broad categories, all space is further subdivided in two different ways: first, by type of room as distinguished by its physical characteristics, and, second, by the function carried out within the room. The type of room is to be divided into major categories which should be uniform between all institutions. Each institution may subdivide each of these major room type categories into more finite subdivisions to better meet its classification needs. The functional classification of space refers to the distinction between the use of space for such purposes as instruction, the various types of research, organized activities, general administration, and libraries.

---

[4] Supplementary details on the methodology of accomplishing the building space inventory, together with forms and instructions, are given in Chapter 11 (Sections II and III).

It is proposed that the following classes of nonresidential facilities be evaluated: offices, teaching facilities, research facilities, library and museum, staff and student services, hospital and infirmary, and farm. In the evaluation of residential facilities, the types of dwelling units to be surveyed include residence halls, student and faculty apartments, fraternity and sorority houses, and other similar housing facilities.

Off-campus housing not owned by the institution requires a unique inventory which is not provided for in this report.

Information Required

1. Identification of Space. Identification of space includes its location both on campus and, in the case of institutions whose sites are not contiguous, off campus; and its designation. If the space is a building, the designation is by name and number; if a room, by number only. If a standard room numbering system has not been adopted, an institution may wish to consider one at this time.

2. History of Space. Historical data to be recorded about a building include the source of construction funds and the dates of inventory, of acquisition by the institution, and of construction.

3. Quantity of Space. Quantitative data concerning a building

include the number of rooms, net and gross areas, air conditioned area, volume, and number of floors.

More comprehensive quantities are necessary for analyzing individual nonresidential rooms, namely, square footage, number of student stations, area per station, an estimate of the optimum number of stations, and the amount of chalkboard in linear feet.

It is suggested that residential room quantities be measured according to types only, e.g., the number of study-bedrooms and their total net area.

4. Quality of Space. The suggested measures of quality for buildings are limited to the type of construction and the type of elevator service that may exist. The institution may expand the list of properties that it would examine.

The nonresidential room is observed in greater detail than the buildings. Required information concerns its air conditioning, type of seating, and provisions for the use of audio-visual aids, including closed-circuit television and sound amplification.

5. Fiscal Value of Building. The primary financial information to be recorded about a building is its book value (exclusive of land value) as carried on the institution's plant ledger.

The recording of other fiscal data, such as the building's appraised value, its insurance value, and its estimated cost of replacement, is suggested. The data selected for collection will depend on the needs of the individual institution.

6. Assignment of Space. The assignment of a space is to be determined, recorded, and apportioned among the various units which occupy the space. One method for apportioning or prorating space among departments is suggested in Chapter 11; however, an individual insti-

tution may wish to adopt a different method.

Maintenance of Space Inventory Data

Upon completing the space inventory, the institution has a choice to make regarding the maintenance of materials and information assembled. At least three choices are possible.

1. Single-use Inventory. The inventory may be completed and an analysis used for a specific inquiry or purpose. However, due to the expense of making a full-scale inventory, institutions should consider the possibility of a perpetual inventory before allowing the data to become outdated.

2. Periodic Inventory. Another choice is to establish a plan under which the inventory information will be updated at prescribed intervals. A biennial review and correction is a possibility. The data, over a two-year period, will probably not become hopelessly out of date, and the effort required to make the data current will not become so great that it is overwhelming.

3. Perpetual (Permanent) Inventory. To be of greatest value as an aid in making administrative decisions and answering inquiries about space, the inventory should be maintained on a continuing basis. Specific responsibility for the above undertaking should be assigned, and all divisions on the campus should be made responsible for continuing cooperation with the office maintaining the records.

Space Utilization Analyses: Need for Perspective

As mentioned previously, recent attention in the area of campus space analysis has been focused on one aspect of the educational physical plant: classrooms and their utilization, perhaps in the process disregarding the proper framework for such analyses.

Scheduled facilities invite the use of quantitative measures and statistical summaries. Offices, libraries, research laboratories, and other spaces which generally are not scheduled do not easily lend themselves to utilization percentages. If an institution reports that its classrooms are used 50 percent of the available hours, there is a strong tendency to interpret this statement to mean either that the institution is inefficient or that it could take twice as many students as it now has. However, at any point in time, an institution's capacity to admit additional students may be limited by any one of several other factors: It may not have the residence halls required to house the students; it may not have sufficient faculty or the offices in which to put them; it may not have the operating dollars to assume the increased costs of additional students; or it may not have sufficient library facilities to accommodate expansion.

Primarily, classroom utilization studies should be used for internal information. Low rates of utilization may suggest either or both of the following courses of action: (1) The institution may build the other-than-classroom facilities to accommodate additional students, thus increasing the classroom use; (2) it may decide to convert more classrooms to other functions (e.g., offices, research laboratories, or study rooms). It cannot be too strongly emphasized that, for the institution as a whole, station utilization cannot be improved by altering the class scheduling procedure. At a given point in time, the number of students and the seats available are both fixed quantities. The rate of utilization is not affected by the hours at which students sit in these seats.

Perhaps the problem would be solved if it were possible to attach utilization rates to other-than-classroom areas. Tradition and realism militate against the possibility. Faculty offices are not susceptible to scheduling. Once a space has been assigned to a research project, a second set of apparatus cannot be piled on top. It is desirable that the student health center be more vacant than full. It is desirable to have the library fully occupied, but other activities such as attending classes and social functions and eating meals lessen the probability.

If, as seems apparent, the concept of rate of utilization must be limited to classrooms and teaching laboratories, then it is important that these classroom utilization figures be carefully interpreted. The quest for improved classroom efficiency leads down the path of institutional objectives, courses of study, admissions procedures, operating budgets, faculty resources, admission standards, and a host of other concerns both philosophical and practical. As one item of information in a continuing institutional self-evaluation, classroom utilization is important. To this end, the following discussion may be helpful.

Measurement of Room Utilization

The most meaningful measures of space utilization appear to be (1) hours per week of regularly scheduled instructional space utilization, and (2) percent of student stations occupied when room is in scheduled use.

Some past studies have expressed the first measure as a percent of an arbitrarily established week (usually 100 percent = 44 hours). As colleges and universities, in response to diverse local conditions, have changed teaching patterns, there appears to be little logic in arbitrarily establishing 44 hours as a standard 100 percent week.

Many universities are scheduling courses earlier and later in the day than the traditional 8:00 a.m. to 5:00 p.m. with an hour off for lunch. In addition, classes are more frequently scheduled through the lunch hour. Many urban universities have extensive evening class programs that should be reflected in space utilization analyses. An arbitrary percentage method of showing classroom utilization not only involves extra, frequently useless, calculations but does not easily provide for evening class schedules. If, for special purposes, percentage figures are desired, they can easily be derived as an added step from the hourly figures. For these reasons, hours per week has been established as the basic measure of utilization.

The percentage of student stations in the room which are occupied when the room is in scheduled use is the second major measure of room utilization. For simplicity, this measure will be hereafter referred to as the "fullness ratio."

Room Utilization Rate Standards

It is not the purpose of this study to recommend standard rates of utilization for teaching facilities. The diverse character and operating conditions of colleges and universities make it difficult to establish national standards. In addition, there are many reasons why actual room utilization rates and fullness ratios tend to be lower than might seem reasonable. Some of these considerations follow.

Factors Which Tend to Lower Room Utilization Rates

1. Specialized Curricula. In many cases, only a small number of students are interested in a particular academic area; thus a specialized teaching laboratory may be used only six hours per week because no greater student demand exists. The laboratory may not be physically

suited for other purposes during the remainder of the week.

2. Room Use That is not Regularly Scheduled. Instructional rooms are needed for many intermittent uses besides regularly scheduled classes. Such uses include meetings, conferences, examinations, student study (in classrooms) and individual laboratory work (in teaching laboratories), and non-scheduled seminars. Individual institutions may or may not wish to keep supplementary records of such uses.

3. Time Needed for Painting and Repair. In any large institution with many rooms, a certain percentage will be out of use at all times for painting and repair or remodeling.

4. Setup Time for Experiments and Other "Blocked Time." Especially in laboratories, time may have to be allowed for setting up experiments before the regularly scheduled class meets. Also, laboratory sections must be scheduled for three-hour periods in order to allow sufficient time to complete experiments. In such cases, an unused hour of the morning or afternoon may be left over, which is too short to schedule a laboratory period. Such periods of time may be called "blocked time," and some institutions may wish to account for them in addition to regularly scheduled class hours.

5. Complicated Curriculum Patterns. Good educational practice requires that certain courses be taken at specific times in the sequence of courses leading to a degree. Consequently, certain specialized teaching facilities sometimes cannot be used because all students who could potentially use the facility are using another specialized facility or taking another course where economy dictates that a large group meet at one time.

6. Need for Flexibility. Matching student schedules, curriculum patterns, professors' teaching schedules, and differing course

credit patterns makes a high rate of utilization impossible if educational standards are not to suffer.

Factors Which Tend to Lower the Fullness Ratio of Rooms in Use

1. Extra Seats Needed for Auditors, Quiz Section Instructors, and Other Persons Not Reflected in Enrollment Statistics. Many classes must have extra seats available for persons who are not reflected in enrollment statistics. For example, professors of large lecture courses may require quiz section instructors to attend lectures. Extra seats are also needed for auditors and occasional visiting professors.

2. First Week Course Enrollments Versus Official Enrollment Statistics. Most universities take their official course enrollment statistics at about the tenth day of the quarter or semester. Because a significant number of courses are dropped by students during the first week, first week enrollments are frequently higher than shown in the official statistics. Extra seats must be provided for these people.

3. Need for Flexibility in Room Assignments. Since students enroll for many courses on an elective basis, precise prediction of course demand is impossible. Classrooms must be assigned in advance of registration, and a "cushion" of extra seats to provide for unforeseen demand must be provided in many classes, if students are not to be turned away. Otherwise, heavy administrative costs for extra counseling and scheduling would result.

4. Logistics of Scheduling. Because classes vary greatly in size, classrooms must be provided in various capacities to meet the demand. Certain courses grow in size each year as enrollments in-

crease, and there must be flexibility in classroom sizes to meet these changes. Consider the hypothetical need for classrooms to house three classes - one of 300, one of 200, and one of 100 students. If there is only one of each size of class, it would not be efficient to build three rooms; one of 300 capacity, one of 200 capacity and one of 100 capacity. All three classes could meet in one 300 capacity room, leaving 100 vacant seats at one hour, and 200 vacant seats at another hour. What might at first seem a waste in having vacant seats is more efficient, however, than having additional rooms full when used, but used fewer hours.

5. Space Efficiency of Larger Rooms. In general, the larger the room, the fewer square feet required per student, because required minimum circulation space and space for the instructor serve more students. Thus there is a space saving as well as salary saving in larger classes. To build a 50-seat classroom is far less than 25 percent more costly than to build a 40-seat classroom. The extra ten seats, even though unused initially, may prove to be valuable as enrollments increase.

6. Difficulty of Rapidly Modifying the Classroom Supply to Meet Changing Conditions. Many classrooms were built years ago to accommodate different educational patterns, and perhaps under conditions of less concern for space efficiency than at present. Although classrooms may be built in the size range where demand is greatest, small increments to a large supply of rooms make small differences in the over-all efficiency of the space utilization pattern. If small classrooms are not used as extensively as large classrooms, one might argue that classes should be split into smaller groups. Instructional salary costs could skyrocket as a result. Conversely, if large classrooms are

not used as extensively as small classrooms, some might argue that classes should be larger or that large rooms should be divided into smaller ones. However, there may not be enough present student demand for larger classes, and it may be cheaper to wait until class enrollments increase with time than to spend funds remodeling classrooms into smaller units now.

Types of Space Utilization Studies[5]

The analysis of room utilization by week for all instructional facilities, as measured by hours of use, may be divided into two categories: (1) by type of teaching facilities, such as general classrooms, seminar rooms, and teaching laboratories, and (2) by type of program, such as day school program and evening class program. In addition, the analysis of room utilization for all instructional facilities and the analyses in terms of the two categories may be further divided into several subcategories: (1) by day of the week, (2) by hour of the day, (3) by building, (4) by college, (5) by non-scheduled room use, and (6) by "blocked time."

Studies of the relationship of class enrollments to room capacity (fullness ratio) offer a means of determining the degree to which rooms are occupied when they are in scheduled use. A matrix table showing the relationship of class enrollments to room capacity may be prepared for each instructional room.

These studies can facilitate local management decisions concerning course scheduling patterns with respect to time and place, as well as future building programs. If such studies are used in conjunction with enrollment forecasts, valuable information can be derived as to when additional instructional facilities will be needed, where on campus they should be built, and what size and type of facilities should be included.

---

[5] Supplementary material on data requirements for space utilization studies and on derived measures of space utilization are given in Chapter 11 (Section IV).

Building Space Data and Equipment Data

As indicated previously, the strong relationship between building space data and equipment data resulted in these two areas being subsumed under the general heading of "Facilities Data." In terms of both the philosophy of the organization of a university and the pattern of data organization envisioned by the over-all Project, Facilities are an institutional resource, along with Students and Manpower, and these three resources are the means whereby an institution carries out those activities appropriate to its role. Thus, facilities data are important to the planning and implementation of such categories of institutional activities as Instruction and Research, and this importance applies to equipment data as well as to building space data. As with building space data, a consideration of equipment data begins with the process of inventory which is a prerequisite to studies of utilization.

The following sections of this chapter are concerned mainly with "movable" equipment. Items of "fixed" or "built-in" equipment are not usually part of an inventory of equipment because questions of dollar value, life expectancy, accountability, and disposition are not involved. Fixed equipment value is taken as part of building value, and accountability for items is not usually assigned to individuals or to administrative or academic units of the institution. However, in regard to movable equipment, the opposite is true.

Definition of Equipment

The class of equipment discussed herein is defined as movable property that meets certain criteria for dollar value and years of probable useful life.

The term "movable" implies the item is neither permanently attached to a building nor incorporated into the building at the time of construction or during later modifications. The term pertains to impermanency of installation and not to bulk or weight. For example, a computer weighing several hundred pounds is usually classified as movable, while an electric fixture of a few pounds is usually classified as fixed. Examples of movable items are desks, files, typewriters, oscilloscopes, microscopes, and the like. Examples of fixed items considered an integral part of the building are laboratory benches with service connections for water, gas, or electricity; fume hoods; cold rooms; chalkboards attached to walls; light fixtures; built-in cabinets or counters; and permanently installed heating and cooling apparatus.

When classifying property as movable or fixed, one must often rely on judgment. Items which are attached to floors or walls may or may not be fixed. For example, a piece of equipment which is anchored to reduce vibration or provide support is usually considered as movable. However, remodeling may require moving built-in cabinets or laboratory benches which are usually considered fixed. The fact that property is capable of being moved does not classify it as movable.

Fixed equipment usually has a life expectancy equal to that of the building, although a building may be gutted and remodeled with all new fixed equipment. Those items which can be moved without affecting the structure of the building are generally classified as movable, those which cannot are classified as fixed. Items not considered an integral part of the structure, such as paintings and furniture, are classified as movable; those items which become part of the structure, such as fire sprinkling systems and alarm and bell systems, are classified as fixed and are included in the building cost.

Some schools use the building contract as a basis for classifying items. If the item is installed by the builder as part of the contract, it sometimes is classified as fixed and included in the building cost. Although expedient, this is certainly not a logical approach to classification. It simplifies the task of classification but does not always permit consistency. Further, it does not provide guidelines for classifying items added later which do become an integral part of the structure or are not movable. Nor does it separate from fixed items those movable items such as specially constructed furnishings which the contractor may provide.

Although the use of building contracts as classification guides is helpful in accounting practices with regard to purchasing and depreciation, such contracts are not useful for other objectives of equipment inventories and utilization studies. The criterion of physical movability should be adopted in classifying equipment.[6]

The criterion of dollar value or cost is used to differentiate equipment from materials and supplies. Items of small value or cost are generally excluded from equipment inventories and are considered expendable materials. Different schools use different dollar amounts to establish this cutoff point between equipment and materials. The range of minimum values extends from $3 to $200. The most common dollar cutoff for classifying equipment is $25.[7] Occasionally state law or local regulations will fix the dollar cutoff value used by an institution. However, the institution itself most commonly must decide the issue.

---

[6] Built-in or fixed equipment is considered further in Chapter 12 (Section II), where forms and instructions for the inventory of fixed equipment and room characteristics may also be found.

In setting a dollar cutoff value for separating expendable materials from equipment, an institution should consider the objectives of its inventory. If fixing responsibility for items is a chief purpose of an inventory, it may not always be economical to use an amount smaller than $25 as a cutoff point. The added cost of collecting and maintaining data for items in a lower range may exceed the value of the equipment losses. This is also true when data are used for insurance purposes. The amount of protection gained by including many low cost items may be more than offset by the extra cost of maintaining additional data.

A study of existing equipment inventory records at one of the institutions within the Project Group tends to support this point. This study analyzed the number of items and the total value of all the items by various dollar value ranges (e.g., $1 to $10, $1 to $50, etc.). Although 78.9 percent of all the items in the inventory fell in the range $1 to $100, the total value represented by all these items was only 15.1 percent of the total inventory value.

In addition to physical movability and dollar cutoff value, the usable life of an item is customarily taken into consideration when classifying equipment. Non-expendable items usually do not change shape or appearance with use, nor do they lose their identity through incorporation into another unit. Different institutions use different standards, but items of less than one year of usable life, even though they exceed the cutoff value, are customarily not made a part of the inventory and are considered expendable. For example, chemicals or specimens for dissection may fall into this category.

---

[7] Based on a survey of the status of equipment inventories in colleges and universities, conducted by one of the institutions within the Project Group. Questionnaires were sent to 670 institutions selected on the basis of size and control; 286 responded. Of those responding, 79 percent conducted perpetual or periodic inventories. When a cutoff value was used, it was most frequently $5, $10, or $25, with the last value being the most popular.

Equipment Inventory Objectives Reported by Institutions

Although the literature devoted to equipment inventory systems is sparce, equipment inventories are not novel to institutions of higher education. The survey of the status of inventories in colleges and universities, already noted, revealed that, of the 286 responding institutions, 51 percent conducted perpetual inventories and 28 percent conducted periodic inventories.

Since the type of data maintained in an inventory system should be determined by the uses to be made of the data, an institution can determine its data needs by selecting a set of inventory tasks it wants to accomplish. Of course, it cannot be assumed that all institutions require the same set of tasks to be performed by an inventory system; therefore, the presentation of data requirements in terms of different inventory objectives permits a greater degree of flexibility in constructing inventory systems. However, this point of view is not meant to suggest that a one-to-one ratio exists between data requirements and purposes. One set of data may satisfy the requirements of more than one objective. On the other hand, an additional objective may require a completely new set of data. Therefore, it is usually better to plan an inventory system in terms of the maximum that will be required of it rather than add objectives, and consequently data requirements, on a piecemeal basis. To go back over several years of inventory data and add, for example, the purchase dates or the location of equipment is no small task. Planning for a maximum use of equipment data at the onset may therefore forestall additional labor at a later date.

In the survey noted earlier, 212 institutions indicated that the determination of responsibility for equipment was an inventory goal. This was, in fact, the most common use of inventory data among the responding institutions. Another important use of equipment data - reported by 145 institutions - was to effect transfer of equipment between departments and divisions. To help justify equipment acquisition from inventory data was a goal of 124 institutions.

Other uses for inventory data, as revealed by the survey, were estimations of future needs, screening of research proposals for equipment on hand and available, computation of overhead costs, maintenance of purchasing information, assignment of space on the basis of equipment needs, providing information for insurance, determining equipment maintenance costs, and creating annual reports (including statements of total assets).

The foregoing inventory objectives are not exhaustive; they do represent, however, the most common reasons for the maintenance of equipment inventories, and as such, can provide a reasonable base upon which to build data requirements.

In addition to the inventory objectives thus far stated, there are certain other criteria which affect data requirements. It is essential, for example, that transactions can be traced within the system in order to preserve a clean audit trail. In order to do this, the system must contain transaction records. If a piece of equipment is sold or traded for new equipment, this datum must be collected and maintained in the records. If equipment is transferred from one department to another, this, too, must be recorded properly so that equipment may be located or responsibility assigned. Such requirements are referred to as system requirements and a discussion of the data needed for system requirements is presented in a later section, "Elements of an Inventory Control System."

Data Requirements and Inventory Objectives

As the study of equipment inventory systems progressed, specific kinds of data emerged as being important and were organized into a maximum-minimum data list. The maximum part of the listing was based upon the results of the survey of the status of inventories in colleges and universities, mentioned previously, and includes those items of data having sufficient importance to be maintained by a number of institutions. The minimum part of the listing consists of selected items judged essential to minimum effective operation.

The over-all list is comprised of six categories of inventory data - namely, document references, identification of equipment, location of equipment, assignment of responsibility, financial information, and special information. A complete listing of the inventory data items covered by these six categories may be found in Chapter 12 (Section III).

In an effort to put into perspective the data requirements of an equipment inventory system, eight specific and typical inventory objectives were identified. These objectives may be summarized as follows: identifying equipment, locating equipment, determining responsibility, screening for equipment on hand, budgeting, providing insurance information, reporting assets, and providing repurchasing information.

With the typical objectives identified, the investigation proceeded to relate kinds of inventory data to the objectives themselves. This resulted in a summary list of data items which supplements the maximum-minimum list by grouping the kinds of inventory data according to their relationship to the eight typical objectives. For detailed descriptions of the eight inventory objectives and the summary list of data requirements according to objectives, see Chapter 12 (Section III).

Allocation of Equipment Costs

Institutions sometimes find it necessary to calculate the costs of equipment in teaching, research, and public service activities. The two most common purposes are studies of resource allocations and calculations of research overhead rates.

Increasingly, institutions are conducting self-studies and analyses of how their resources are used. In order to provide data for an allocation of equipment costs to institutional activities, some institutions may wish to make provisions in their inventory records. Generally, however, such allocations are not done regularly but usually are special studies conducted only when the need for the data arises. Most often, this need arises in connection with the establishment of overhead rates for contract research. It is possible, however, to build into inventory records certain data which will aid in making such allocations.

There are various approaches to assigning equipment costs to research, teaching, and other activities, but invariably such allocations must rest upon a system for prorating equipment costs to various institutional activities. For example, if the costs of equipment involved in research activity are needed, then equipment used in research must be identified. The problem, however, is not as simple as it might first appear.

If a piece of equipment were used only for research, only for teaching, or only for public or supporting services, each item could be accurately labeled according to its intended use and prorations could be easily developed. In reality, some equipment has multipurpose utilization. An electron microscope may be used to train graduate students in techniques of micro-analysis, and at the same time it may be an integral part of a research project. Thus, although some equipment can be identified as single-purpose (such as that belonging to a research division or, in the case of instruction, classroom and teaching laboratory equipment), there will be a body of items that are multipurpose (such as office furniture and some technical apparatus). The problem then is to identify such multipurpose equipment and evaluate its contribution to certain specified activities.

One solution is to code single-purpose equipment according to the activity in which it is involved and to code multipurpose equipment with a special character so it can be analyzed separately. There are several methods by which the cost of multiple-use equipment can be distributed among various activities of an institution.

In the past, a very simple approach to analysis has been used, but is generally not acceptable as a good cost accounting method. The cost of multiple-use equipment was divided among departmental activities on the basis of faculty effort reports or budgetary allocations of salary. These were averaged for a department. The average percentage of time or salary devoted to research was then applied to the cost of equipment, and a proration of cost was obtained. The same was done for the average percentage of time or salary devoted to instruction and other activities.

This method has particular appeal for schools prorating salaries by faculty activities or for those obtaining effort or time reports from their faculty. On the assumption that a high degree of accuracy is necessary, there are some weaknesses in the method. It assumes, for example, that equipment is evenly distributed among the faculty in terms of its cost. This, of course, is not so. One man with a high percentage of research effort may use hundreds of thousands of dollars' worth of multiple-use equipment. It is obvious that an average of the two men's effort will not produce the same cost allocations that individual proratings will. Yet prorating equipment costs on the basis of each individual's time would be extremely difficult, if not impossible.

Another approach prorates equipment costs by space utilization. There is a clear relationship between a room and the equipment contained in a room. The equipment not only follows the uses to which the room is put, but it determines the ways in which the room can be used. For example, specific equipment is needed for some kinds of research, but the equipment could be housed in almost any kind of room. Consider, for example, the use of an indoor squash court to house the first atomic reactor. Most activities are constrained by the equipment involved with certain exceptions: some types of teaching, for example, are conducted outdoors - field trips and surveying and art courses are cases in point. But here the environment rather than the equipment is the determinant of the activity. In actual practice, equipment creates an environment within a room that is conducive to certain activities but not conducive to others, and thus acts as both abettor and constrainer.

It is possible to identify the purpose of rooms by the activities which transpire therein. Activities, in turn, are made possible, in part, by the availability of certain kinds of equipment. Equipment may be either single-purpose or multipurpose. When all equipment in a room may be used for a single purpose only, and when all equipment in a room has the same purpose, the room may be considered to be a single-purpose room.

When more than one type of single-purpose equipment (e.g., both equipment used solely for teaching and equipment used solely for research) are present in the same room, that room may be said to be multipurpose.

In this definitional scheme it is contradictory to have multipurpose equipment in a single-purpose room and, hence, this category is not possible.

Despite this relationship between equipment and rooms, it is more usual to conduct room utilization studies and to prorate room usage by activities than it is to conduct equipment utilization studies, simply because the room is an easier unit of measurement than a piece of equipment. To prorate equipment costs in this manner, it is merely necessary to distribute costs of equipment in the same proportions as room prorations.

Room prorations may be determined either by the proportion of square feet devoted to each activity in a room, or by the proportion of time the room is used for each activity. Either method allows for reliable prorations of multipurpose rooms, and while such rooms may be few, they require special attention. This approach is more accurate than the foregoing one (based on the salary or activities of individuals) because it analyzes multipurpose equipment costs on a room-to-room basis, whereas the faculty salary or time approach lumps all equipment and averages all effort or salaries to arrive at an over-all departmental proration.

The analysis of space utilization makes it possible to prorate equipment costs to single-purpose equipment in a single-purpose room, and to multipurpose equipment in a multipurpose room. However, in the case of single-purpose equipment in a multipurpose room, it is not reasonable to allocate costs to the several activities which take place in the room when single-purpose equipment can be involved in only one activity.

To overcome this difficulty, a further degree of refinement is needed. A third approach is to prorate costs by the proportion of time that equipment is used in various activities. To obtain such utilization data, it is necessary to examine records (where they are available) or to ask a responsible person to establish the amount of time each piece of equipment is used for each activity.

It may not be desirable for some institutions to use this method since it involves considerable time and, therefore, expense. However, it will give more reliable results than any of the methods previously outlined. Further, it is the only method by which the utilization of single-purpose equipment in multipurpose rooms can be reliably studied. Since multipurpose rooms are probably not common, it may be necessary to inventory only relatively few pieces of equipment by this more exact method.

Elements of an Inventory Control System

The first step in designing an inventory control system is to specify what objectives are to be met by the reports produced by the system. Then it is necessary to determine what operating, statistical and analytical reports are necessary. This step is essential for determining those data required to produce the reports. When both required reports and required data are known, it is possible to decide the methods for collecting and processing data. Regardless of whether data will be handled by computer, unit record equipment, or a manual system, problems of data input, processing, and reporting arise and must be solved.

Efficient input of data is dependent upon efficient collection of data. This sometimes calls for devising special forms and techniques to record and transmit new data and changing data. The nature of forms and techniques vary depending upon the type of data processing employed and the kinds of reports desired.

For optimum operation of a system, it is essential that an office or position be designated as responsible for all information concerning equipment. In many cases, it will be a property manager, or a business officer, or a purchasing agent. It is the responsibility of the position to collect needed data on new equipment. It should be noted that the position responsible for collecting the data is not necessarily the one that decides what data are needed; the data needs are established before the system is operational.

The physical location of a property office should also be considered since it has a strong relationship to the collection of data. One of the most desirable locations is in the proximity of the institution's receiving dock. Here the property officer has access to the ordering documents as well as to the equipment as it is received. Some equipment, primarily that which need not be tested, can be tagged with identification numbers before it is delivered. Additional items of information can be obtained more easily, if they are needed, while the equipment is on the receiving dock.

Responsibility for maintaining up-to-date information for the inventory system about each piece of equipment should be delegated to the property manager, or purchasing agent, or similar position. Fixing responsibility for data is as essential as fixing responsibility for property. Any movement of equipment or transfer of equipment between departments should be either approved by the person in this position, or at least recorded by him. Thus, he is able to account for the disposition of an item, and to furnish current data about the piece of equipment for input into the information system.

Data which are subject to change, and thus require updating, include location, assignment of responsibility, appraisal value, disposal, function, and condition of equipment. It may be that one form can handle all such changes, with a separate form for data about new acquisitions. Some of these changes may be obtained only periodically at the time of an audit of equipment. Other changes may be part of an on-going, updating methodology.

In processing equipment data, the system should be set up as one basic file subject to two kinds of transactions - additions and changes; deletion is a special kind of change.

The key element in a file is a positive identification of an item. The cardinal requirement is that any identifying number should not be duplicated. This basic rule must not be violated except in the case of group items. To avoid duplication, the most practical way to set up a file is by identification number in serial order. This makes it possible to control processing since no new item will bear a number already existing in the file.

A check should be made periodically to establish that inventory identification numbers are not duplicated. If property records are on punched cards or magnetic tape, this check can be programmed into the system.

Any data involving transfer or change obviously must bear the same unique number as the item under consideration in the original inventory. This is essential in order to maintain the history of an item. Without this provision, the record of changes and transactions involving that piece of equipment will be lost, and the effectiveness of the inventory system will be lessened.

All records of new items, or changes about old items (such as transfers or changes in accountability for the item) should be retained and held until at least the end of a fiscal year and possibly longer. The initial purpose for recording a change is, of course, to update the master file of equipment data. However, by retaining records of changes, particularly when they are in the form of a punched card, it is possible to process them and analyze them separately to determine volume of purchases, transfers, lost or stolen items, and so forth.

The operation of the inventory control system will be made more efficient if, in addition to identification numbers, codes are employed. Data which lend themselves to coding are those included in the maximum-minimum list of inventory data items provided in Chapter 12, (Section III). In general, a single digit, or letter, code is adequate for each datum, e.g., a code for disposition, for probable function, and for similar data. For more numerous data, several characters may be necessary, as for example, in coding assignment of responsibility. To code class and subclass data about a piece of equipment, a scheme such as the University of California Class Codes is suggested (described in Chapter 12, Section III).

Reports should be produced on all items in the inventory on a yearly basis. The annual report can be organized in three different ways: first, a complete reproduction of the entire master file; second, a sequential listing of items in terms of the organizational units and/or individuals responsible for them; and, third, listing by class of item. In addition to annual reporting, once a month a breakdown of items in terms of transactions can be produced. Again, it is useful to list these according to responsible organizational units or individuals. The monthly report, taken in conjunction with the annual report, will produce an up-to-date account of the entire inventory. Although a high degree of summarization is not needed in the monthly report as it is in the annual report, the monthly report can serve to show, by listing changes, the extent to which the annual report has been altered.

In designing a system, it is important that it be kept open-ended and flexible to allow items of information about a piece of equipment to be added to a record after the initial system has become operational. This is a distinct advantage because it allows a record system to be changed as the requirements for data, or output, change. Of the many advantages to the open-ended system, the chief one is that additional information can be added subsequent to the initial development of the system without redesigning the entire system.

If the foregoing procedures are carried out, one of the results will be the creation of a good audit trail for each item within the equipment inventory. An audit trail is visual evidence of transactions that provides for re-creation of the records relating to a piece of equipment at various points during its existence. The evidence relating to an item includes the original documents, record of transactions involving the item, and reports produced.

One of the primary purposes of an audit trail is to show by records that an item is used in a manner consistent with the rules and requirements governing it. More specifically, the audit trail is concerned with fixing responsibility for the item in terms of an organizational unit and/or individual, and determining the physical location of the item. These data should be available at all times in the inventory system. In addition, a complete record of all persons or units previously responsible for the item should be present, along with all locations where the item was previously located. Practically speaking, the master record will probably be able only to contain the current status of the item and the immediate past status of the item. However, by keeping records of transactions involving the item until the end of a fiscal year, it is possible to keep a complete audit trail on the item and, when necessary, produce this information for review and control purposes.

Recommendations

As to evaluation of building space in colleges and universities, it is recommended:

1. That the principles underlying the need for, and methods of implementing, building space inventories and space utilization analyses, as discussed in this chapter, be accepted not only as a basis for the establishment of initial inventories and utilization analyses, where needed, but also as a basis for further examination of the purposes which such studies can serve.
2. That the specific definitions and procedures comprising the building space inventory system and the specific measures of classroom utilization, as presented in this chapter and in Chapter 11, be given consideration in any development of a national system of reporting facilities data. The foregoing is subject to one qualification,

namely, that further testing of the system in terms of the classification of nonresidential rooms by function should be conducted in order to determine whether those institutional functions or activities recommended elsewhere in this report are workable in lieu of the traditional functions incorporated in the system as outlined in Chapter 11. Time did not permit this testing during the Project. Such testing should be done for compatibility to be achieved among all data areas developed during this study.

As to the inventory of equipment, it is recommended:

1. That, in general, the definitions of movable and fixed equipment, as given in this chapter, and the delineation of objectives and related data requirements for the inventory of movable equipment, as given in this chapter and in Chapter 12, be adapted by colleges and universities to their particular needs in the design and implementation of equipment inventory systems.
2. That, in particular, the list of maximum and minimum data for the inventory of movable equipment, as described in this chapter and detailed in Chapter 12, be accepted as a working guide by institutions that wish to establish inventory systems.

CHAPTER 7

FINANCIAL DATA CONCEPTS

SUMMARY

This chapter focuses on the problem of how to describe institutional activities in monetary terms. The problem is complicated by the fact that several responsibility centers - each with its own operating budget - may be involved in the performance of a single activity.

The main categories of institutional activities are considered to be Instruction, Teaching-Research, Research and Development, Creative Activity in Art and Scholarship, Teaching through Creative Activity in Art and Scholarship, Public Service, and Supporting Services. The specific activity that an institution may wish to describe at a given time for a given purpose may be a component of one of these main categories - for example, the activity of instruction within a program leading to an appropriate baccalaureate degree.

It is believed that a solution for the preceding problem may be found in a consideration of the budgetary control and accounting concept generally used today, the activity concept which represents a different type of measurement, and the relationship of the budgetary and activity concepts. It is further believed that consideration of the relationship of the budgetary and activity concepts can provide a means for obtaining information for the development of more sophisticated patterns of financial projection, control, and analysis than are now possible. This information would supplement that presently provided by generally accepted accounting practices. The discussion results in a recommendation that institutions, in developing monetary descriptions of activities, consider relating the budgetary and activity concepts.

Financial Data Relationships

The discussion in this chapter concerns the conceptual relationships between accounting categories and the categories of institutional activities depicted in Zone 5 of the Data Organization chart.[1] These categories are intended to cover most of the significant and measurable activities upon which institutional resources are ordinarily expended. Such activities may be described in terms of the kinds of manpower involved, the amount of effort expended by individuals, and the quantity of space and/or equipment used, or in terms of the financial value of these resources. As outlined in the Data Organization chart, the main categories of institutional activities are Instruction, Teaching-Research, Research and Development, Creative Activity in Art and Scholarship, Teaching through Creative Activity in Art and Scholarship, Public Service, and Supporting Services.

The methods of financial reporting as described in _College and University Business Administration_, Volume 1,[2] are widely accepted and used. The purpose here is to augment these accepted accounting practices and principles with methods for obtaining and using additional financial information. This information has become necessary as a result of increased demands by administrative offices, governing boards of regents and trustees, legislative bodies, and Federal agencies. These methods deal with the allocation or distribution of monetary values to various activities. Therefore, it is apparent that a modified financial statement taking into consideration the cost of institutional activities would be an operating statement, because institutional operations are being measured. This operating statement would augment the conventional statement and might not agree in total, since some expenditures may not represent activities.

---

[1] Much of this discussion is based upon the content of the Data Organization chart presented and/or described in Chapters 1, 8, and 13.

[2] Washington, D.C.: American Council on Education, 1952. (This volume and its companion, Volume 2, were known to be under revision as of the time this chapter was prepared.)

Because endowment principal, construction funds, and other restricted funds may not flow through the system, the balance sheet is not a part of the financial data system being discussed. It is the use of funds and not the availability thereof which measures the subject cost.

Institutional activities are performed by use of the following institutional resources: Students, Manpower, and Facilities (Zone 4). In varying degree, each of these resources can be described in monetary terms. These resources, having many combinations of interaction, become the means whereby activities are performed, which contribute to broad institutional programs: Education, Creation and Revision of Knowledge, and Public Service (Zone 6).

Prior to the actual flow of funds through the university financial system, the following sequence of steps is assumed to take place: (1) establishment or recognition of specific educational objectives (detailed specifications of Education, Creation and Revision of Knowledge, and Public Service); (2) programming of activities necessary to attain objectives, and description of them in budgetary form; (3) establishment or review of resource requirements, expressed in budgetary form; and (4) review of sources of income, acquisition of additional funds (if necessary), and allocation of both to the budgetary expression of (2) and (3), followed by budget revision and re-allocation, as necessary.

When activities to implement objectives become operational, the following steps take place: (1) Direct expenditures by budgetary classification are recorded (however, the recording and documentation must be in accordance with existing restrictions connected with each source of income, e.g., restrictions that govern use of funds for a particular sponsored research program) and (2) comparison of budgeted income and expenditure with actual income and expenditure begins soon after documentation starts and continues until the close of the budgetary period.

At the end of a budgetary period, standard and special analytical studies may be made of the financial data connected with the activity (most often these are cost-finding studies) in order to solve immediate problems or to establish policy for resumption of the activity or initiation of similar activities.

Thus, the flow of funds presupposes a prior sequence of planning steps, orderly documentation, interim budgetary analysis, adjustments, and final analytical study. This flow of funds is a cycle of events occurring again and again in a manner sufficiently stable as to allow comparability of data within an institution. If common data procedures are widely accepted, comparability can also exist among institutions.

From the foregoing rationale and from the fact that the modern university has broadened its activities, it is apparent that activity classifications must be up-to-date, accurately described, and capable of logical extension as new activities evolve. This requires periodic revision of standard classifications. It also leads to increased emphasis upon evolving financial data systems and procedures for relating typical budgetary and activity concepts.

Budgetary Reporting Compared with Activity Reporting

Under the budgetary concept, funds are allocated in accordance with pre-established standards, while under the activity concept, reallocation is after the fact, based upon information from manpower, space utilization, and enrollment reports and the like. A statement of expenditure of funds can be prepared on each basis and the amount of difference or variance indicated. The areas of substantial variances can be investigated and future budgets adjusted accordingly. In some cases, it may be necessary to redistribute budgeted funds; in other instances, certain checks and balances may have to be built into certain reporting procedures - e.g., in the area of manpower - in order to achieve more accurate information than is now available. Activity reporting can be used as a feedback for the purpose of setting standards during the development of the budget for subsequent operating periods. A proper allocation of funds may come from an area lying somewhere between the budgetary concept and the activity concept.

The budgetary concept provides for the recording of expenditures by responsibility center, often without consideration of the functions carried out by such a center. (A responsibility center is an organizational unit for administrative and budgetary purposes.) Under this concept, when costs are compared between one institution and another, it may be found that no real comparability exists, because the functions of a responsibility center at one institution may be much more inclusive than those of an apparently like center at another institution. If one can allocate costs to activities within such centers, one is in a much better position to adjust the information to obtain comparable statistical data.

The establishment of a chart of accounts to reflect proper identification of various elements of measurement is necessary in order to develop an over-all integrated system of information on university activities. Many institutions have constructed a chart of accounts based on current, widely accepted account classifications. This type of chart of accounts can be expanded to show a relationship between budgetary and activity classifications.

Budgetary Concept

The budget serves as a summary projection, in monetary terms, of the scope of activity and standard of performance established by responsibility centers for the institution. Updating and revising the budget are continuous operations.

College and university accounting systems generally provide a consistent basis for measuring the direct expenditures for operating such responsibility centers as colleges, divisions, and departments, but not for measuring the cost of various activities within these organizational units. Through subsidiary accounts, many institutions use various cost accounting systems and/or techniques to assign costs, including indirect costs, to various activities. However, the principal monetary elements from which the traditional budgetary framework is constructed include income, current expenses, plant funds, endowment, and loan and aid funds.

Income

It cannot be assumed that a definitive relationship always exists between source and application of funds. Although revenues are, in many cases, restricted for a specific purpose and the direct cost of certain activities therefore can be identified with the source of funds, other income may be restricted only to broad, general purposes. However, if a total monetary description is to be obtained for each activity, including indirect expenses, it is obvious that funds may come from several sources for the actual support of an activity. A complete connection between sources and application of funds can easily be accomplished for certain restricted accounts, especially for such accounts as research projects which are individual agreements and retain, to some degree, their identities. Such accounts can, in effect, be classified as sub-responsibility centers or activities. The source of such funds can be traced directly to the application thereof. However, a project may also be supported by institutional funds or funds provided by other sponsors. Funds for the support of indirect expenses of a project or projects may come from other sources. Since unrestricted income is co-mingled, it is not feasible to trace expenditures to individual sources. Therefore, it is impractical to try to obtain a complete relationship between sources and application of funds when talking about total activity costs.

Current Expenses

These expenditures represent those that are made from current funds for carrying out the regular functions of the institution. They include such items as personnel services, operating supplies and expense, and travel. Accounts are generally maintained to measure the expenditures for operating each organizational budgetary unit. However, many institutions are using cost accounting procedures for the assignment of costs to various types of institutional activities such as instruction, research, and public service. Nevertheless, it is recognized that accounting records to develop monetary descriptions of all the possible divisions of the categories of institutional activities previously listed would be, for most institutions, too costly to maintain.

Plant Funds

This item represents funds expended for acquisition of, and major improvements to, land, buildings, and equipment.

An institution will generally receive the benefits of plant fund expenditures for many years, and during any one year benefits will be received from such expenditures of prior years. Therefore, to describe activities in monetary terms, institutions should establish depreciation or use charge rates which reflect, in a reasonable manner, the amount of the physical plant used up in operating the institution for any given period of time.

Use charges, as allowed by many agencies, may be an expedient means of assigning plant costs to various activities. However, such charges should not be construed as an estimated description of the physical plant consumed during the accounting period.

Endowment and Aid Funds

The availability of these funds is not the relevant factor in describing institutional activities. It is the expenditure of these funds that is pertinent here. The use of such funds to support instruction, research, and public service, and to acquire physical plant should be handled in a manner consistent with that already discussed under current expenditures and plant funds.

The use of aid funds for scholarships and loans should not be reflected directly in the costs of institutional activities. Most of these funds are passed on to the student or credited to his account and flow again through the institution's income accounts. The expenditure for instruction is not directly influenced as a result of the student's source of funds. Of course, the expenditure of scholarship and loan funds will directly affect enrollments, which, in turn, will affect indirectly the cost of various activities. The amount expended for student aid is important, and it should be reflected in financial statements as a separate item.

Activity Concept

Income, expenses, plant funds, and endowment and aid funds become related to the activity concept by means of data from reports on the distribution of faculty effort among activities, reports on space utilization, and related studies.

Under the budgetary concept, the accounting system measures dollars expended for operating responsibility centers. However, when several responsibility centers engage in the same activities, the activity approach will cut across these centers. For example, academic counseling may be performed by the personnel of a counseling bureau, by deans, and by faculty, thus involving several responsibility centers. By using supplemental information, such as data from faculty activities reports and space utilization and related analyses, the costs of operating responsibility centers can be reallocated to the institutional activities performed.

Activity reporting by individual faculty members provides for distribution of effort among academic/academic-professional activities. This type of individual reporting includes not only those academic/academic-professional activities that parallel institutional activities but also certain professional activities not within the formal framework of institutional activities (e.g., Formal Personal Education). Therefore, using faculty activity reports and assigning monetary values to the activities as indicated in the Data Organization chart will result in value judgments with respect to an activity carried out for institutional purposes. It should also be noted that a system of checks and balances is necessary to determine whether individual effort reports are realistic. For example, a faculty member extremely interested in research may be biased in prorating and reporting his research effort.

Also, there is the likelihood that some of the faculty may report an activity on the basis of what the budget indicates it should be, in order to avoid being asked to explain differences.

The distribution of personnel costs may be difficult to administer on the basis of the activity approach. For example, an administrative staff member often performs services which should be allocated to several activities, and it is necessary to measure such services in a manner consistent with, although perhaps not as conclusive as, the manner in which the activities of academic/academic-professional personnel are measured.

Likewise, the allocation of space and related operations and maintenance charges, including depreciation, are assigned on the basis of general departmental intended use or purpose for which a facility was constructed. This is also true, to some extent, with respect to equipment use. These costs may be allocated to various activities by using manpower and student enrollment data.

In connection with enrollments and other student data, most registrars have data on student status, course level, and teaching personnel, and these data can be identified with respect to upper- and lower-division students, undergraduate and graduate instruction, and related categories. It may be appropriate to mention that some institutions have been required by their governing bodies to report categories of students according to level of instruction. If institutions use the definitions developed in various areas of this over-all investigation and if they relate the budgetary and activity concepts in regard to level of instruction, files of information can be rearranged to provide compatibility for assigning costs.

Relationship Concept

The relationship concept is not entirely new. Essentially, this approach relates the budgetary concept and the activity concept. Many institutions use it periodically to develop reports which are required for specific purposes. Estimates are made of building space or manpower effort, and the costs thereof are assigned on the basis of sampling. The relationship concept proposed is a more complete and sophisticated approach and would provide invaluable information for special purpose reports. For example, the activity and relationship concepts make feasible many valuable analytical cost studies. These may be cost studies of an activity that occurs within one responsibility center or within several such centers; each study of this type would measure the cost of a distinct activity, such as lower-division instruction within a department, division, or larger unit. There may also be program cost studies, which measure the costs of several activities that are directed toward a common, defined objective. Again, these program costs may be contained in one responsibility center or they may involve several centers. Programs may range, for example, from those combined activities necessary to an undergraduate degree program to those required for the operation of a graduate instructional and research center. Unit costs - so often suggested by the term "analytical studies" - are activity costs expressed in a particular unit of measurement.

The need for conducting significant activity cost studies is usually very great, depending on the particular institution's magnitude of operation. Some activity cost studies may be easily accomplished, such as the cost of undergraduate instruction provided by a particular discipline, expressed in terms of cost per student credit or contact hour. Others are complex, such as the cost of instruction for graduate students having fellowships or traineeships from Federal agencies, expressed in terms of cost per student. However, the need for program cost studies has not yet been fully recognized. With the activity and relationship concepts applied to cost-finding methodology, program cost studies may be undertaken with some promise of significant results.

By relating the supplemental information from activity cost studies to budgetary information, it is believed that costs can be allocated in a reasonable manner to certain institutional activities and thereby provide guidelines for the proper allocation of funds in future operating periods.

The following list of sample analytical studies is composed largely of program cost studies, each requiring several separate activity cost studies:

1. Degree Program Costs. What is meant by this term can be more informally suggested by such questions as, "How much does it cost to produce an electrical engineer? A general practitioner in medicine? A graduate chemist (Ph.D.)?" Among the activity and related costs will be appropriately proportioned salaries of degree department faculty, faculty providing service courses, and supporting staff, together with proportional expenses for supplies, services, and equipment, including the operation and maintenance of facilities, plus numerous other items, all expressed in terms of significant and compatible units. Many activity costs are directly "accountable" - that is, they can be traced to an actual component of the activity. However, some activity costs are necessarily based on ratios developed from activity data and may be averages. As can be seen, degree program costs are among the most complicated to develop.

2. Summer, Evening, and Short Course Program Costs. Since these programs vary greatly with the institution, studies of their costs should incorporate the variables that are most significant for the institution and for the purpose of each study. In general, the types of activity

costs expressed in (1) above will apply here. However, a new variable, especially pertinent to evening and short course programs, concerns media of instruction. In the past, the use of television and other technical devices has not been a challenging cost variable. In the future, it may be inescapably important.

3. Research Activity or Program Costs. Since the modern university looks upon research as complementary to instruction, cost studies of research activities or programs are important. Many research projects are separately budgeted, and activity and programs costs are, therefore, easily obtainable. However, if research projects are not separately budgeted, program costs must be found through an approach such as is offered by the activity and relationship concepts.

4. ROTC Program Costs. For most institutions, program cost studies on this subject would be concerned with the cost relationship between such programs and the total institutional program or between such programs and the courses in lieu of which ROTC is taken.

5. Interdisciplinary Instructional Programs. With the breaking down of classical barriers between disciplines, interdisciplinary instructional programs, both graduate and undergraduate, are slowly finding a place for themselves. In many changing or experimental situations, program or activity costs provide one of the necessary quantitive guidelines for evolving policy. Since interdisciplinary programs involve resources from several budgetary or organizational units, the activity and relationship concepts provide a workable approach to cost studies of significant value. If special effort is made, reliable studies can be made almost concurrently with program implementation, rather than after the fact. This immediacy is especially important in experimental programs.

6. Library Programs. Library cost studies are often done on an

activity basis, with the unit of measurement being cost per student. Obviously, this is not a truly significant unit, any more than cost per faculty member would be. Libraries actually have several functions: a teaching function, in which they are partners with the teaching faculty for the benefit of students; a service function, one part of which might be service to researchers, with another being service to the community; and a research function which involves research into their own operations. Each of these functions could be the subject of a significant activity cost study, and, in total, these activities (and perhaps others) could constitute a significant program cost study.

7. Thesis Supervision. To date, this activity is virtually immeasurable in most colleges and universities. Since student credit for thesis work is not the same as student credit for organized classes, it helps little when thesis work is made into a variable credit course and given a number. Moreover, some institutions do not give units of credit for thesis work. Therefore, it is a large enough activity to have an identity of its own, usually under the general concept of teaching. It is suggested that the concept of teaching-research, explored in Chapter 3, may provide an avenue for solving the problem. If the components (including thesis supervision) of teaching-research can be separated, then thesis supervision will be quantitatively identifiable. Therefore, cost studies of this activity based, in part, upon an instructor's percentage of time or effort per student, each student being considered a "class" or section, will have merit.

Potential of the Relationship Concept

A review of the budgetary and activity concepts and how they can be related suggests the potential of the relationship concept.

Current income from various sources is co-mingled, with certain exceptions, and a general pool of funds is available for institutional operations. Certain income, such as that received under contractual agreement or restricted gifts and endowments, can be traced directly to the expenditure thereof.

The assigned application of funds follows the budgetary concept and represents conventional accounting procedures. The costs resulting from these applications would be reflected in regular operating expenditure statements.

The resources used in carrying out institutional programs are identified as manpower, students, and facilities. The use of these resources to carry out various activities can be measured, at least to some extent, in monetary terms using the activity concept. This concept utilizes manpower, equipment, space, and enrollment reports to distribute costs according to reported activity.

Statements of expenditure based on each of the preceding concepts can be compared and substantial variances can be noted.

By analyzing the various reports which may be generated under the relationship concept, the areas of substantial variances may be investigated and perhaps adjusted to some degree. These reports provide additional statistical information which may augment regular reporting methods, and such information can be used in the evaluation of the various programs which have been carried out, and in setting standards of performance for subsequent operating periods.

Colleges and universities have grown so large and complex that administrators cannot possibly maintain personal first-hand knowledge of all problems but must have factual analytical reports of operation. Manpower and facilities information in such terms as numbers of people and square feet of space are useful but difficult to combine because of the different units of measurement. When manpower and facilities are translated into monetary values, a common denominator is created. The suggestions in this chapter are efforts to develop measurements for non-profit institutions comparable to those available to businesses. As the systems for collecting detailed statistical information about the uses of manpower, enrollments, and facilities are implemented in colleges and universities and refined through actual use, even more sophisticated financial analysis is possible.

Recommendations

It is recommended that institutions, in developing monetary descriptions of institutional activities, consider relating the budgetary concept and the activity concept. It is believed that, in so doing, institutions will be enabled to develop a more sophisticated pattern of financial projection, control, and analysis than is possible if only presently accepted accounting principles and practices are used.

CHAPTER 8

THE ORGANIZATION OF INSTITUTIONAL DATA

SUMMARY

This chapter focuses upon an analysis of the Data Organization chart. As a visual representation of the organization of institutional data, the chart allows for logical inter-connections between many data areas and provides a foundation upon which a total information system for colleges and universities can be built.

Institutions are cautioned as to the problems inherent in data organization, namely, those of definition, classification, continuity, and matching. The many interrelationships among the several data areas of this report are then suggested through the eight zones of the Data Organization chart: Population Bank (Zone 1), Financial Bank (Zone 2), Organizational Structure (Zone 3), Institutional Resources (Zone 4), Institutional Activities (Zone 5), Institutional Programs (Zone 6), Output (Zone 7), and Institutional Characteristics (Zone 8). The analysis of the chart begins with Zone 4 which is considered the heart of the data organization structure.

Based on the discussion in this chapter and the supplementary materials in Chapter 13, recommendations are made to the effect that an institution should relate all its essential elements to its specific purposes, that the organization of data should be based upon a coherent pattern of data gathering and processing, and that particular attention should be given to the matter of relating resources and activities. In addition, it is emphasized that an appropriate classification of institutional activities, together with a set of consistent definitions of these activities, is especially important.

Needs for Data

During the last ten years, demands for data on the operations of colleges and universities have resulted in more time and effort being spent by institutions in gathering, processing, analyzing, and maintaining data of increasing variety and volume.

Not only do institutions spend more time collecting data for themselves and their governing bodies, but they do so for outside groups as well. Federal and state agencies, educational associations, and private foundations are all active in gathering statistics about higher education. Schools even ask one another for information for purposes of interinstitutional comparison. Both historical and long-range data must occasionally be supplied for questionnaires, as well as the usual requests for current statistics.

The need for information about higher education cannot be expected to diminish. On the contrary, it will continue to grow because the necessity to coordinate, regulate, interpret, and forecast will increase; in addition, the techniques of analyzing data about higher education are developing rapidly and bringing about changes in data collecting, handling, and analysis. Moreover, the sheer bulk of data will grow because enrollments, faculty and staff, and facilities will continue to increase.

Satisfying Data Needs

Some large institutions have created special offices to collect and supply data, perhaps an office of institutional research or an office of planning and development; occasionally a data processing center functions as a data collection and interpretation center.

Many smaller schools do not have an agency for centralized data collection and analysis. Questionnaires and reports at these schools may be handled by any one of several different offices; usually the office keeping the file from which the requested data will be drawn is responsible for answering a particular questionnaire or supplying a particular report. Requests for student data, for example, usually go to the registrar, who keeps student files; financial data to the comptroller or business office; and faculty data to the dean of faculty or the president of the institution.

Data Files

At many institutions data for questionnaires or reports are drawn from files designed primarily for day-to-day operations. Often the depth and breadth of the data in such files are limited. Producing the information requested, therefore, many times involves a crash program, and on occasion the files may not be capable of supplying the material needed. Reports generated from such files are sometimes limited by the accessibility, scope, and arrangement of the data in the files.

When requests for data cut across several files in several offices, new problems arise, because data in one file may be organized in a manner inconsistent with another.

Problems of Data Organization

Even when an office for central data collection is maintained, problems of interrelating data may not be solved, for such offices usually draw upon many sources within the institution for their information. Unless careful attention has been given to the organization of an institution's files, the task of putting reports and questionnaires together by a central office calls for considerable ingenuity in data manipulation. Four common, but major, difficulties experienced when combining sets of data are problems of definition, problems of classification, problems of continuity, and problems of matching.

Definitions

Problems of definition are not uncommon when data from several files or offices are integrated. For example, a full-time student according to a housing office may be one carrying the number of units required for residency in a dormitory. A full-time student according to a business office may be one carrying the number of units at which full tuition rates are charged. The registrar may call an undergraduate student full-time when he carries fifteen units because this is an accepted standard for a full-time equivalent undergraduate. Graduate students may be labeled full-time by a graduate school according to several standards. If data for full-time students are collected from two or more of these offices, obviously differences in definitions must be taken into consideration, particularly if data are to be merged.

It is also possible for different definitions to exist side by side in the same office or in the same file. There is nothing unusual about different definitions existing side by side, since they are usually designed for different purposes. It is unlikely that one definition for a full-time student could serve an entire institution without drastic changes in operating policies. But the interrelating and interpreting of data are not made easier by a multitude of definitions. Misinterpretations of data are likely unless there is complete awareness of the definition lying behind a particular category.

Classification

Unlike classification structures also create problems when statistics from different sources are merged. This is particularly the case when summaries are combined. The fact that two separate files might define full-time students in the same way is not enough to insure good manipulation of data. If the percentage of full-time freshmen residing in dormitories is needed, it can usually be obtained by dividing the number of full-time freshmen in dormitories by the total full-time freshmen in the university, assuming both files define a full-time student similarly. If both offices use the classification "freshman" when summarizing their data, and if it means the same in both offices, there may be no problem. But if one office includes freshman students in a broader classification such as undergraduate or lower division, there can be a problem and additional effort may be required to extract the information.

When data are combined from two or more files, they can be merged at a level of classification common to both files. For example, if data are summarized at the level of departments, they can be combined with summaries by college in terms of college only and the summary by department is lost in the merging. In order to make the best use of data summaries, therefore, there must be some common classification structure between files. Only in this way can the fullest interpretation of data be realized.

Continuity

Continuity of data often becomes a problem, particularly when longitudinal studies are involved. If definitions are not consistent from term to term and if classification structures change periodically, combining current data with past data becomes especially hazardous. John Ernest Jones in the first semester can become J. Ernest Jones, J. E. Jones, John E. Jones, or Ernie Jones the second semester. Man numbers designed for alphabetical arrangement of data can and often do change over the years when the numbering system gets overcrowded. Many other variables in data can make comparisons between years a frustrating task.

Some consistent elements between sets of data collected at different times must persist in order to make longitudinal studies possible. In the case of student data, this is usually a unique number, such as a matriculation number. Some schools are now using a social security number as a consistent element for sets of faculty, staff, and student data.

Matching Between Files

The three points thus far presented are pertinent to both manual and automated data systems. Definitions must be consistent for either method, and they must be consistent over a period of time. Classification structures must follow the same general rule with, however, some special consideration in the case of automated data. If linking elements exist between files, data can be manipulated by machine in a way that classification structures are needed in only one of the two or more files to be combined. This is not peculiar to automated files only; manual files are also capable of this type of manipulation. However, the speed of an automated system makes this factor especially pertinent.

To illustrate: Consider again the problem of calculating percentages of freshmen in dormitories. The data could have been obtained manually even if the classification of freshmen did not exist in one of the files. A list of names of full-time freshmen and a list of names of dormitory residents would provide all the necessary data for the calculation. Each full-time freshman living in a dormitory could be identified and a total obtained. Practically, however, this would be too time-consuming unless there were a small number of freshmen involved.

With both files automated, the time required to make the search would be considerably reduced. But an automated approach could be used only if linking elements were present in both files. In the example just described, the linking element would most likely be a student number. Numbers of all full-time freshman students matched against numbers of all dormitory students would reveal the full-time freshman students who are also dormitory residents. With this approach, the classification structure need not be identicalbetween files in order to locate full-time freshmen in each file.

Thus another problem posed when files of data are interrelated or combined is a lack of linking elements between files. The student numbers of full-time freshmen and the student numbers of full-time freshmen in dormitories can be matched only if each numbering system is isomorphic. That is to say, John Ernest Jones must have the same number in each of the files.

Occasionally alphabetic matching is used rather than numerical matching. This is usually not as successful as number matching because misspellings, abbreviations, name changes, and dissimilar arrangements of names weaken the isomorphism. Further, it is a much longer machine process than numerical matching since each letter of both last and first names must be matched to obtain accurate one-to-one identity.

Summary of Major Problems

The foregoing problems are often present whether a central data collection office exists or not. However, when a central office for data collection does exist, it is more likely that such problems may have been eliminated. Usually, in self defense, such an office is driven to organizing the data files with which it must work. Definitions will be agreed upon or thoroughly understood before analysis is attempted, classification structures will be set up, consistency from year to year established, and linking elements put into files to render them accessible for automated data retrieval.

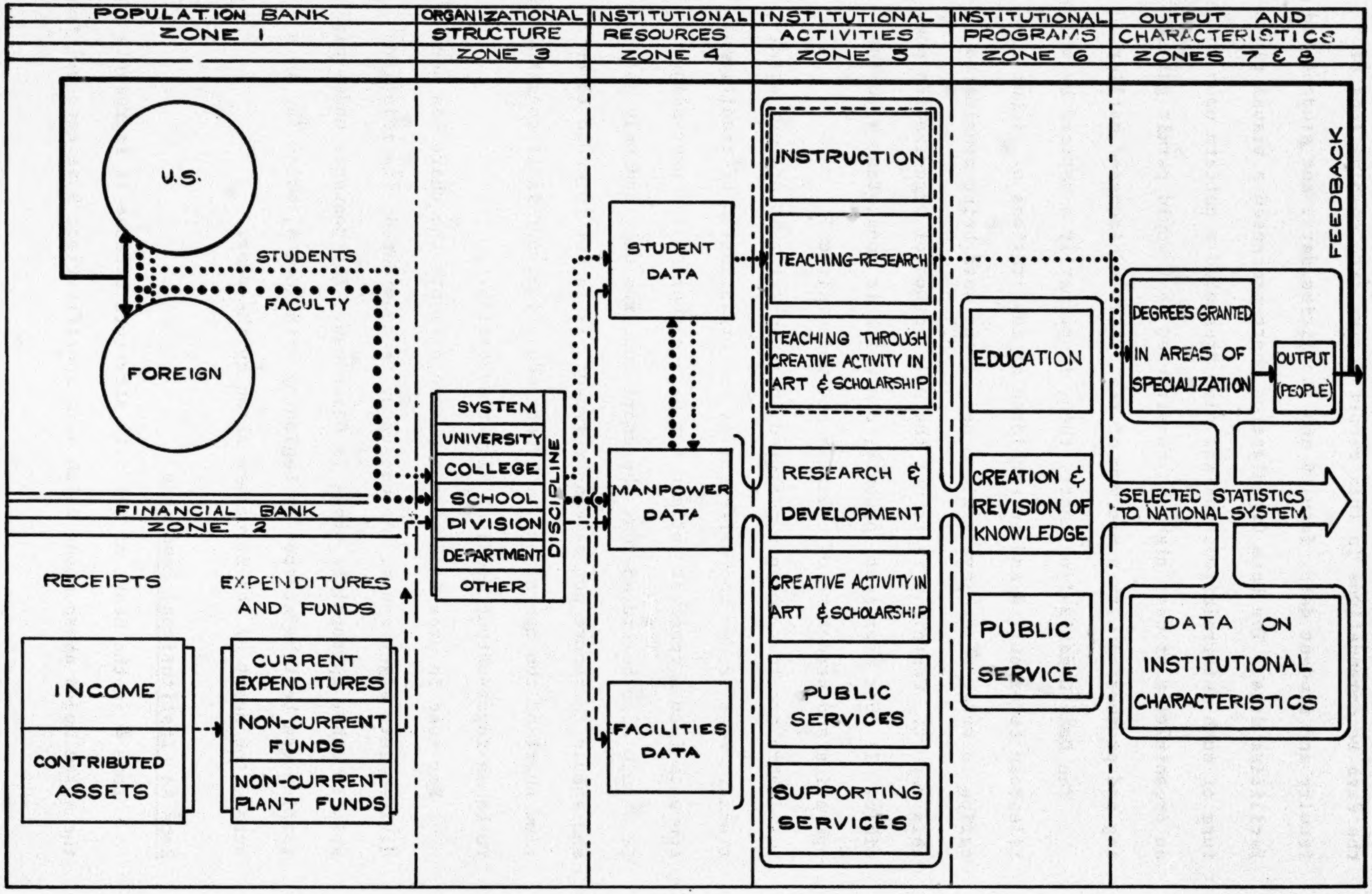
Usually all this will be done, but not always. For when files for day-to-day operations are also the files used for data analyses, restrictions on modifications have a way of developing. It is not always possible to insist on a linking element because one office may have used all the columns in the student master card, or the extra work involved to punch the linkage into the card cannot be absorbed by the office preparing the file. Sometimes conflicting interest over the isomorphic element will delay the organization of the files for data collection and analysis. But unless there is a concerted and persistent effort to organize data files, there will be sharp limitations in the uses of institutional data for analytical purposes and for operating reports.

It is clear then that there is a great need for data at institutions of higher learning and that this need will continue to grow. It is also apparent that there are a number of problems that must be overcome before data collection and interpretation can be effectively accomplished.

The Data Organization Chart: Its Purposes

Although Chart 8-1, Data Organization, was initially designed to circumscribe the scope of the Project in terms of the sectors for which data specifications would be written, it soon became apparent that it was not enough to set down minimum data specifications and categories for data assembling. It was also necessary to indicate how data can be interrelated and combined. This was particularly so since many of

Chart 8-1. Data Organization


POPULATION BANK ZONE 1
ORGANIZATIONAL STRUCTURE ZONE 3
INSTITUTIONAL RESOURCES ZONE 4
INSTITUTIONAL ACTIVITIES ZONE 5
INSTITUTIONAL PROGRAMS ZONE 6
OUTPUT AND CHARACTERISTICS ZONES 7 & 8
U.S.
STUDENTS
FACULTY
FOREIGN
FINANCIAL BANK ZONE 2
RECEIPTS
EXPENDITURES AND FUNDS
INCOME
CONTRIBUTED ASSETS
CURRENT EXPENDITURES
NON-CURRENT FUNDS
NON-CURRENT PLANT FUNDS
SYSTEM
UNIVERSITY
COLLEGE
SCHOOL
DIVISION
DEPARTMENT
OTHER
DISCIPLINE
STUDENT DATA
MANPOWER DATA
FACILITIES DATA
INSTRUCTION
TEACHING-RESEARCH
TEACHING THROUGH CREATIVE ACTIVITY IN ART & SCHOLARSHIP
RESEARCH & DEVELOPMENT
CREATIVE ACTIVITY IN ART & SCHOLARSHIP
PUBLIC SERVICES
SUPPORTING SERVICES
EDUCATION
CREATION & REVISION OF KNOWLEDGE
PUBLIC SERVICE
DEGREES GRANTED IN AREAS OF SPECIALIZATION
OUTPUT (PEOPLE)
FEEDBACK
SELECTED STATISTICS TO NATIONAL SYSTEM
DATA ON INSTITUTIONAL CHARACTERISTICS

the data recommendations in this report derive from combinations of faculty and student data, faculty and facilities data, and student and facilities data. The Data Organization chart presented a visual picture of such interrelationships and also presented a pattern upon which an organization of data might be constructed that would permit gathering and processing with a minimum of the problems discussed earlier.

The Data Organization chart, then, is primarily a pattern by which files can be organized and interrelated at institutions of higher education in order to achieve maximum use of the data being considered in this report. Certainly it is not the only method of organization possible. It does represent, however, one which is consistent with the operation and structure of colleges and universities.

There are few concepts pictured in the chart that are not traditional. What is new and different is the organization of traditional concepts into a coherent pattern for data gathering and processing. It should also be stated that the chart concerns data and only data, and should therefore not be misconstrued. It is not intended to be a flow chart of the operations of higher education, nor is it constructed to be an input-output model of higher education.

For ease in presenting its separate elements the chart has been divided into eight zones. As each zone is considered, its relationship to other appropriate zones is described. The concepts under discussion can best be grasped by beginning with Zone 4, which is, in a sense, the heart of the structure shown by the chart.

Zone 4: Institutional Resources

Zone 4 is the heart of the data structure because it represents the three major areas about which data specifications have been written.

Earlier chapters have discussed these areas in terms of concepts, definitions, and minimum data requirements (i.e., minimum in the sense that these data will permit analysis of internal operations and allow adequate response to questions about internal operations from outside sources).

Zone 4 is also the heart of the structural pattern shown in the Data Organization chart in the sense that it represents data about the three primary resources of higher education: students, faculty and staff, and facilities.

These three resources are basic to all the activities, purposes, and goals of higher education. Without them, higher education could not take place. In the activity of instruction, students, manpower, and facilities are involved; in research and public service, manpower and facilities are employed; independent study requires both a student and facilities. Some of these basic resources are present in everything that is done at or by an institution of higher education.

The Data Organization chart concentrates on the facilities, the manpower, and the students making up the institution. It deals primarily with institutional resources.

Zone 4 shows a separate box for student data and another for manpower data. There is justification for separating people into these two groups even though, by creating these categories (manpower and students),some overlapping occurs. The different nature and the different uses of the data in each category make a distinction between student data and manpower data desirable. It is convenient, therefore, to keep the distinction even though there is overlap when a staff member carrying course work is recorded both as a student and as part of manpower, and a student employed by the institution is similarly recorded twice.

The overlapping of students and manpower is shown by the light dotted line leading from the student data box to the manpower data box. This line indicates that some students do become part of manpower data. Similarly, the heavy dotted line leading from the manpower data box to the student data box conveys that some members of the faculty and staff carry course work and are therefore represented among student data. The differences between the two groups are fairly clear cut. An individual hired as a faculty or staff member who is also carrying course work is still primarily a faculty or staff member. A student who is employed to assist in the operation of the institution is still primarily a student. Such personnel appear in both student and manpower data, and the ideal would be to assign them identical numbers, such as a social security number, in both files of data so that, should it be desired, duplication could be excluded.

Student Data

Students are considered to be a resource because they are the raw material of the educational process; they are the operands of the system. The student data box in Zone 4 represents the minimum elements of student data recommended by the Project Group. It includes all personal, historical-educational, and current educational program data outlined in Chapter 5.

It should be understood that the data in the categories represented by the three boxes in Zone 4 may be distributed among many files in several different offices. These data may be drawn together from files in an admissions office, a registrar's office, a housing office, deans' offices, departmental offices, testing bureaus, counseling offices, the physical plant division, and the like. A permanent and unique student identification number functions as a linking element among all files of student data. Each file containing elements of student data should carry a permanent student number or some other linking element (name, social security number, alpha sort number, etc.) as a mechanism for bringing together and processing student data.

Manpower Data

The manpower data box in Zone 4 represents mainly those data on academic/academic-professional personnel, as recommended by the Project Group. These data are discussed in Chapter 2 and listed in Chapter 10. In addition, most institutions may wish to maintain more limited data on supporting personnel.

The linking element among all manpower files is a permanent and unique identification number for faculty and staff. Each person employed by the school, on either a salary or wage basis, should be assigned such a number, and the number should appear in every file which manpower data will be drawn from. This procedure should also apply to those faculty and staff who contribute their services, as in the case of many schools with religious control.

Facilities Data

The facilities data box in Zone 4 represents those data that should be maintained about buildings, special facilities, improvements other than buildings, land, equipment, livestock, and materials. The data to be maintained about such facilities as buildings, nonresidential rooms, and equipment will result from the building and room inventories detailed in Chapter 11 and the equipment inventories detailed in Chapter 12. In the case of nonresidential rooms, utilization studies will also result in data to be maintained. Data requirements for utilization studies are also given in Chapter 11.

The linking elements between all files of facilities data are the property numbers. In the case of structures, this number will be expressed as a building number or a room number. For equipment, improvements other than buildings, livestock, and land, property numbers can function as linking elements bringing together data from different files.

Linking Elements

There are linking elements, other than a student number, that can be used to integrate data between the major data categories represented by the three boxes. A course number is an example of this type of linking element. Among student data, each course carried by a student is recorded. In general, this would be a class card. It follows that by searching student data in terms of a particular course number, the enrollment in that course can be determined. Since individuals registered in any course can be expressed in terms of permanent student identification numbers, it also follows that other items of data recorded for each of the students can be gathered in terms of the course number. Course numbers can be gathered by departments and departments by colleges. It would be possible, therefore, to analyze high school ranks, aptitude test scores, and year levels of students in terms of the courses, the department, and the college in which students are enrolled. For analyses of grading patterns, such information is highly useful. This technique also permits the creating of class lists and reports showing lower-division students in upper-division courses and upper-division students in graduate courses. Reports of courses with small enrollments can be constructed and similar analyses involving courses.

Among the manpower data, each course taught by a particular faculty member is recorded. It is possible, therefore, to integrate data about the person teaching the course (professional specialty, rank, age, length of employment, college, department, and similar items) with data about the students enrolled in the course. Such a combination of student and manpower data will produce student-faculty ratios, credit output reports by college, by department, by instructor, by course, or by level of the course, and similar analyses.

Inasmuch as courses are assigned to classrooms and laboratories in terms of a building and room number, facilities data also become accessible. The number of stations in the room can be compared with the enrollment in the course, for a study of student station utilization. Further, if equipment is assigned a room number, these data can become involved in the analyses also.

Other Data Combinations

Combinations of data in the categories represented by the three boxes in Zone 4 may be made in other ways by means of elements which appear in two or more of the three files. Not only can credit output, class hours, and head-counts by year, level, degree objective, and department or college be determined, but credit output can be distributed by faculty ranks within departments or colleges and by types of instruction. Square feet of office space per faculty member can be calculated by combining manpower with facilities information. Square feet of instructional space per full-time student can be obtained by linking student data and facilities data. Many other combinations are, of course, possible.

Zone 3: Organizational Structure

Some possible stratifications of data and data combinations are represented by Zone 3. One institution's data may be grouped with data from other institutions to form statistics for a system, such as the

University of California system. A traditional approach to analyzing the resources of an institution is to divide or examine data by sectors that represent major responsibility centers, such as colleges, departments, or divisions.

Occasionally, data about a particular office or project are needed. This suggests that a code number is needed for each responsibility center that the institution may wish to analyze separately. For student, faculty, and facilities data, this should be at least at the departmental level.

There are times, however, when groupings of data are needed which cut across the traditional categories of college and department. Such categories as the physical sciences, the humanities, health-related programs, the social sciences, and the professions are typical of stratifications not commonly met in the structuring of data by responsibility centers. Usually such categories can be devised by piecing together elements from conventional stratifications. Thus, all departments of science are combined to produce the category of sciences. In constructing a system for data gathering and processing, however, it is best to devise a coding system that allows data to be organized along the lines of desired stratification. Obviously, one is faced here with choosing the most useful of a great variety of possible groupings. Guides for developing such a system can be obtained from questionnaires such as those of the U. S. Office of Education, the National Science Foundation, and other agencies. Internal needs may also dictate certain stratifications which are useful in analyzing institutional data.

Allowance for such divisions of data is represented in the Data Organization chart by the column labeled "Discipline," which cuts across the standard stratifications in Zone 3.

Zones 1 and 2: Population Bank and Financial Bank

Zones 1 and 2, "Population Bank" and "Financial Bank," represent the origins of the resources categorized in Zone 4. Neither in Zone 4 nor in Zone 1 are people, things, or populations being dealt with per se. What is being considered is data about students, manpower, facilities, population, and finances.

Zone 1 is intended to suggest those data which are useful to higher education in determining resource allocations both for the present and the future. Such data would include current and projected statistics for both student and manpower analyses. For example, the number of Ph.D. holders in the population is directly related to the staffing problems of higher education; likewise, the number of college-bound high school graduates is related to the facilities and manpower data represented in Zone 4. These relationships can be determined through analyses of pertinent sectors of population data. Zone 1 is meant merely to call visual attention to the relationships of such data to the internal data of the institution.

There are also obvious, but strong, relationships among the data represented in Zones 4 and 2. The number of faculty an institution hires and the number of buildings it constructs depend, in part, upon the money available to purchase these resources. The enrollment size of an institution may depend to some extent upon the amount of tuition fees or upon the size of student aid funds.

Similarly, there are relationships between Zones 1, 2, and 4. Consider, for example, the complex relationship that exists between the enrollment potential in Zone 1; the enrollment increases, classroom sizes, and faculty requirements of Zone 4; and, consequently, the finances of Zone 2.

The categories of finances implied in Zone 2 would be structured according to presently accepted accounting practices that are typically directed toward financial control within responsibility centers of the institution such as colleges, departments, divisions, and administrative subdivisions. However, unless the responsibility center happens to be a single-purpose unit, the categorization of monies in terms of responsibility centers poses problems involving resource analysis in terms of financial measurement. One major problem involves the assignment of dollar measurements to activities of responsibility centers where a number of different activities are measured by a single accounting category. Two examples follow.

The faculty of a department of music may engage in teaching, in the scholarly development of knowledge, in creative compositions of music or arrangements of music, and in public service when they conduct, play, or arrange for public presentations. All of these activities would typically be contained in Zone 2 under one heading, "Teaching and Departmental Research," within the subheading "Department of Music."

Again, in a science department, teaching, research, public service, and student services, as well as other activities, are typically performed. The expenditures of the department will generally appear as an entry in the category "Teaching and Departmental Research" and also in "Organized Research," if the department is part of such a program. In addition, there may be a number of separate research accounts for contracts or grants from outside sources. Full-time equivalent personnel in organized research and those doing contract research can be grouped to produce a sum for research activity, but research conducted on departmental funds is not as easy to extract and requires special efforts to do so since it is not distinguishable within the larger category "Teaching and Departmental Research."

Yet institutions are often required to do precisely this. Not only are they asked by controlling bodies and by outside agencies (computation of research overhead is a clear-cut case of measurement by activity) for dollar measurements of activities performed, but they ask themselves for activity measurements in order to analyze their internal operations and allocate their resources according to needs within the institution.

When institutions make dollar measurements of single activities, such as teaching, research, or public service, they are generally _ad hoc_ in nature. However, _ad hoc_ activity measurements are rapidly becoming regular studies as more and more importance is assigned to determining specifically what the educational dollar buys and how much it buys.

Many schools, in order to supply these data for analyses, use activity reporting to supplement accounting categories, which are designed more for control purposes than for measuring activities. By obtaining information about the distribution of faculty effort, institutions are able to isolate at least the salary portion of expenditures for various activities. This approach, in most cases, has been directed toward identifying research or teaching activities for purposes of cost analysis.

To return to Zone 2, since money is not involved directly in the activities of higher education except as it purchases resources, financial data have been set apart from the primary resource data (students, manpower, and facilities) represented in Zone 4. This is not meant to imply that money is not a resource, since, obviously, it is fundamental to the acquiring of faculty and facilities. It is, however, not a resource in the same sense that students, manpower, and facilities are resources.

Recapitulation

It may be helpful at this point to return briefly to Zone 4 to review the concepts so far presented before moving on to a discussion of the remaining zones. Zone 4 has been described as the core of the Project. Other chapters of this report present data specifications for each of the three major data areas: student data, manpower data, and facilities data. It has been recognized that data within these areas are not kept in one file but are usually kept in many files; linking elements, therefore, have been provided to allow merging of these data. It has also been stated that among the three files in Zone 4 certain elements can interrelate manpower and student data, student and facilities data, and manpower and facilities data. Further, the overlap between faculty and staff data and student data has been pointed out. Certain stratifications of these data have been presented in Zone 3, and the interrelationships of Zones 1, 2, and 4 have been suggested.

Thus far, data have been discussed primarily in terms of facts about, and categories of, people (students, faculty and staff); things (equipment, special facilities, improvements other than buildings, livestock, and materials); and places (buildings, rooms, and land). Little has been said about institutional activities in connection with finances. To obtain a fuller view of an institution's operation it is useful to know upon what activities resources are expended. Without this information, it is not possible to analyze thoroughly the allocations and the use of institutional resources.

Zone 5: Institutional Activities

It is not assumed that the categories of institutional activities discussed herein are final. First, not all of them have been completely and thoroughly tested. Some have been, and they have borne up well under faculty and administrative examination and use. A number of them, however, need further testing to establish their relevance and validity. Second, some of the activity categories will have varying degrees of importance for different institutions. What may be a highly significant activity at one institution may be negligible at another.

Nor will there be perfect agreement on the components constituting the major categories. This fact became apparent among the representatives of the institutions within the Project Group. What one institution saw as a supporting service another considered public service. What one considered public service another felt more properly belonged with teaching. So it will always be among individual institutions. Each will interpret somewhat differently the intent and orientation of its activities. But, by and large, institutions will seek better and more accurate methods of analyzing their resource allocations. Obviously, then, an important aspect of the internal analysis of an institution is a description of the uses to which its resources are put. To this end, the list of activities represented by Zone 5 and detailed in Chapter 13, was constructed.

Criteria for Activities

The list is designed to be comprehensive enough to describe the activities which take place at most institutions of higher learning. Such activities are, of course, many and varied. There are, however, some activities which all schools have in common, and many which most schools have in common. One would expect, for example, that instruction is certainly common to all institutions of higher education. Supporting services are also typical of all schools, although conceivably an institution using the facilities of another institution might have many fewer supporting services than another. Research and public service may or may not be found as activities of any size. Certain institutions, such as land-grant institutions, may have greater public service activity than those which are not land-grant. Probably large universities engage in more research activity than most smaller institutions. Junior colleges generally direct their activities primarily at instruction and those supporting services necessary to instruction, although they may also engage in research and public service activities.

In addition to comprehensiveness, one other criterion was used in the selection of institutional activities - namely, only those activities which were considered significant, measurable, and upon which an institution's resources are ordinarily expended were included.

There are significant activities at an institution which are either unmeasurable or extremely difficult to measure. The interrelationships between students and between student groups is an example. A peer group may have greater impact upon students than course content or teaching methods, but unfortunately such interactions are not easily measured even though institutional resources may be expended upon them. Also, there are measurable activities which are not always significant. Time spent cleaning typewriters is measurable but of doubtful significance. Some activities are both measurable and significant, such as the activities of some faculty and student organizations, but, frequently, no institutional resources are expended upon them.

The categories presented in Zone 5, then, are intended to be comprehensive enough to cover most of the significant and measurable activities upon which institutional resources are usually expended.

The Main Categories

There are seven main categories of activities, as follows: (1) Instruction, (2) Teaching-Research, (3) Research and Development, (4) Creative Activity in Art and Scholarship, (5) Teaching Through Creative Activity in Art and Scholarship, (6) Public Services, and (7) Supporting Services.

In Chapter 13, these activities are described in detail, primarily in terms of their many components. Main categories are divided into subcategories, and the latter are divided into subheadings. For example, under the main category, "Supporting Services," there are several subcategories, one of which is "Educational Services;" under this subcategory, one of the several subheadings is "Training Schools."

To facilitate further understanding of Zone 5, without going into the detailed classification of activities as presented in Chapter 13, the main categories and their subcategories are outlined below; all subheadings and descriptions are omitted. For the main categories, "Public Services" and "Supporting Services," the subcategories given are believed to represent typical activities but are offered primarily as examples.

I. Instruction
    A. Instruction Leading Towards a Degree or Certificate
    B. Non-Degree Instruction
II. Teaching-Research
III. Research and Development
    A. Research
    B. Development

IV. Creative Activity in Art and Scholarship

V. Teaching Through Creative Activity in Art and Scholarship

VI. Public Services

- A. Agricultural Services
- B. Home Economics Services
- C. Veterinarian Services
- D. Urban Extension Services
- E. International Services
- F. Cultural Programs
- G. Radio and Television Services
- H. Ancillary Schools
- I. Conference and Public Meeting Administration
- J. Public Health Service
- K. Public Information Service
- L. Audio-Visual Public Services
- M. School Services

VII. Supporting Services

- A. Educational Services
- B. Student Services
- C. Personnel Services
- D. Library Services
- E. General Administration
- F. General Institutional
- G. Operations and Maintenance

IV. Creative Activity in Art and Scholarship

V. Teaching Through Creative Activity in Art and Scholarship

VI. Public Services

- A. Agricultural Services
- B. Home Economics Services
- C. Veterinarian Services
- D. Urban Extension Services
- E. International Services
- F. Cultural Programs
- G. Radio and Television Services
- H. Ancillary Schools
- I. Conference and Public Meeting Administration
- J. Public Health Service
- K. Public Information Service
- L. Audio-Visual Public Services
- M. School Services

VII. Supporting Services

- A. Educational Services
- B. Student Services
- C. Personnel Services
- D. Library Services
- E. General Administration
- F. General Institutional
- G. Operations and Maintenance

It should be noted that there is a close relationship, but not an identity, between the preceding list of seven main categories of institutional activities and the list of ten categories of academic/academic-professional activities given in Chapter 3. Six of the main categories of institutional activities are identical in intent with six corresponding categories of academic/academic-professional activities. The other category of institutional activities, "Supporting Services," would absorb two of four remaining activities in Chapter 3 - namely, "Administration" and "Intra-University Activities." The remaining two academic/academic-professional activities, "Formal Personal Education" and "Other Extra-University Activities (excluding Public Service)" are considered to be personal, not institutional, undertakings.

It should also be noted that, in creating the list of institutional activities, every attempt was made to follow as closely as possible the accounting classifications set forth in College and University Business Administration, Vol. 1. However, exact correspondence was not possible, and the relationship of the two classifications is explained in Chapter 12.

Zone 6: Institutional Programs

Zone 6 sets forth the three programs of higher education: Education, Creation and Revision of Knowledge, and Public Service. The term "creation and revision of knowledge" was chosen rather than "research" because it more broadly describes the scholarly investigations of the humanities, the creative activities of the fine arts, and the research activities of the sciences than does the term "research" which is primarily associated with activities of the last group of scholars.

Theoretically, all activities at an institution of higher education should lend themselves to at least one of these programs. It is recognized that supporting services contribute indirectly rather than directly to them, and that it is not always possible to get a sharp distinction even among activities that are direct rather than indirect. Some direct activities, for example, may be partially oriented toward each of the programs shown in Zone 6.

Zones 7 and 8: Output and Characteristics

Zone 7 recognizes one measurement of the output of an institution - namely, degrees granted in areas of specialization. Certainly, there are other measures of output than degrees. Credit output, cumulative credits of graduating students as a percentage of all student cumulative credits, yearly credit output, faculty publications, and number of research projects are measures of output, but no attempt has been made to suggest these measures visually.

The line labeled "Feedback," leading from Zone 7 back to Zone 1, takes into consideration the fact that colleges and universities, for the most part, must depend upon the output of higher education to staff their faculties. This condition is becoming increasingly important in the analysis of data about higher education as output in terms of degree production continues to fall behind demand for degree-holding manpower.

Zone 8 represents characteristics that are potentially valuable for describing institutions. For example, it is important to know whether data are about a two-, four-, or five-year institution. It is also important to know whether it is a university, a four-year college, or a junior college, and whether it is a public or private school, what geographic area it is located in, and what levels of degrees it grants.

The arrow leading from the data areas labeled, "Selected Statistics to National System," suggests that sometime there may be a central data processing agency for all pertinent data about institutions of higher education. It would be helpful to send selected statistics on an annual basis to a central office which, in turn, would feed government agencies with the data they require. Schools would profit by supplying stipulated raw data on a periodic basis rather than answering sporadic questionnaires. Agencies would profit by receiving their data in the form of processed reports.

Combinations of Data

Theoretically, the combinations of data represented by the zones of the Data Organization chart would be very great. For practical purposes, however, some of the items should be eliminated. For example, there would seldom be a need to create sets of data based on names or social security numbers. It would be of little value to obtain the mean grade average of all students named Smith. On the other hand, there are categories that are capable of useful expansion. One item of recommended student data is geographic origin. This item is capable of considerable subdivision: by country, by region, by state, by county, or by city. However, an enumeration of the total number of combinations possible using the data specifications recommended in this report would be neither meaningful nor particularly useful.

It was, therefore, considered better to select a number of the more useful reports and analyses that can result from the organization of data as represented by the Data Organization chart. These are presented in Chapter 13.

Uses of Institutional Data in Administration

Organizational Structure

The modern institution of higher education is a complex organization requiring the special skills of competent administrators to function effectively. No less true than of any organization, a college or university needs effective administration in order to meet the objectives set for that institution which may be considered as its purpose for existence.

Viewed as a formal organization, the university is more complex than the usual bureaucratic business or industrial organization. Lines of authority are more diffuse and the hierarchy of positions, except at the top levels of management, are not as clear for the university as for business. In many ways, the university is more like the large modern hospital with its parallel lines of organization and authority, one medical and one administrative. Both the university and the hospital deal with services directed toward the improvement of human conditions, and both must coordinate the efforts of highly skilled professionals in order to achieve their broad objectives.[1]

The objectives of colleges and universities vary among institutions. A commonly held purpose is to instruct students, to encourage their learning and, by graduating them, to send them into society equipped with experiences beneficial to them in the new roles they will assume.

The administration of an organization has as its task the creation, maintenance, and perpetuation of an atmosphere for activities that fulfill institutional objectives. In terms of the previously stated common purpose of educational institutions, the task of administration is to create an atmosphere for students so they are presented with optimal conditions for learning. In addition, each institution has other specific objectives and related tasks for its administration. Its organizational structure should facilitate the realization of its goals.

---

[1] These similarities have been discussed by G. Gordon and S. Becker, "Changes in Medical Practice Bring Shifts in Patterns of Power." The Modern Hospital, Vol. 102 (February 1964), p. 89ff. The role of self-study and data needs of colleges and hospitals are described by Richard L. Wessler and R. H. Richart, "Institutional Research in Health Organizations." Hospital Progress, Vol. 25 (June 1964), pp. 87-90.

In larger schools there are at least two lines of organizational responsibility. One is the academic hierarchy and responsibility embodied in such positions as provost, academic deans, and department heads. The other line is made up of positions whose functions are to provide supporting services. The responsible positions are executive vice presidents, administrative deans, and staff department heads.

Academic manpower consists of faculty and other academic-professional specialists. In an organizational sense, this is a group of person specialists because each has his own peculiar set of competencies and areas of specialization. Members of this group are not interchangeable; it is obvious they are not interchangeable between departments, and, to some extent, they are not interchangeable within the same department. In contrast, most supporting staff positions, except at the highest echelons, are specialized by task. Secretaries and clerks can shift from one office to another with few resulting problems.[2]

Traditionally, it is easier to fit a group of task-specialized positions into a hierarchy than it is to establish a bureaucratic order of person-specialists. Therefore, lines of responsibility and authority for nonacademic personnel are relatively clear. The faculty, on the other hand, usually does not order itself so neatly, but as a group is stratified by traditions, personal accomplishments, and prestige. This stratification does not necessarily correspond to the formal organizational hierarchy.

---

[2] For further discussion of person-specialists and task-specialization, see Victor A. Thompson, Modern Organization, (New York: Alfred A. Knopf, 1961).

Academic manpower has increased greatly at major universities and, with the development of new institutes and special research projects, it has become even more difficult to fit specialists into the traditional hierarchy. Their introduction into the organization has not only added to the vagueness of organizational lines, but has made the task of leading and coordinating the activities of the faculty more complex and more imperative.

Other specialists have been introduced to the campus whose function is not to teach or to do research, but to achieve subgoals that allow the main goals to be attained by academic personnel. Data processing specialists are among these people.

Some academic personnel become administrators, at which point their function is not to teach or to do research, but to allow conditions to prevail so others may teach and do research. In these roles they face an entirely new set of conditions, have new experiences, and use different skills. They make decisions affecting others, such as on which date to begin a new school term, a small decision perhaps, but one made as administrators, not as scholars.

To administer well requires adequate facts on which to base plans and decisions. Other people are depended upon for gathering facts. The facts that are gathered, the way in which they are gathered and reported are crucial to effective administration. Before examining the ways in which the administrators of a college or university may make use of data collected and reported to them, a review of the steps involved in reporting data may be helpful.

Measuring and Reporting Data

In considering the uses of data, it is well to understand what a datum is. A datum is a single symbolic representation of a property of an object or event. Most often the symbol is a numeral or set of numerals. A symbol may represent the average or typical height, weight, value, age, etc., of a group of things; it may represent the projected or anticipated status of a property of an object or event. Data are not themselves facts, but represent facts.

In order for data to be useful, they must be translated from symbolic states into meaningful states. When data have significance for the user, they become information. The significance of information depends upon its relevance to the problems and tasks to which it is brought to bear. Data which have no relevance to what the user knows and must do in his position have no immediate significance or information value. With this orientation, the application of data is more easily appreciated.

The observable facts of a university are the properties of its various objects and events, such as facts about buildings, grounds, equipment, people, and what people do. Activities may be defined as standing patterns of behavior that are extra-individual and have a definite relationship to a milieu. All of these exist over time, may be viewed historically, and anticipated as future events. From knowledge about human participants, physical space, and available equipment, it is possible to list the potential activities that can occur in a given institution. The actual activities are a part of the list of potential activities.

Two essential components of any activity are people and facilities. Facility resources include buildings and grounds which provide spatial boundaries for activities and equipment such as books and other objects essential for activities. Human resources may be classified as students, faculty, and staff.

Finances are instrumental in obtaining resources that are, in turn, instrumental in producing activities. These are simultaneously existing events separated by the adoption of three perspectives: fiscal, structural, and functional. Taken together they produce a replica of existing events.

Since all the facts exist simultaneously over time, these perspectives are adopted in order to deal with the facts:

1. One may look at the facts as fiscal data, i.e., the financial aspects of university operations.
2. One may view the structural components of the institution, i.e., its students, manpower, buildings, equipment.
3. One may give attention to the functional organization of the institution, i.e., the activities which are carried out.

To interrelate these three perspectives conceptually, a consistent set of definitions is needed. These definitions are provided through the Data Organization chart and the related lists of terms that may be found in various chapters of this report. The chart allows for logical inter-connections among Finances (Zone 2), Resources (Zone 4), and Activities (Zone 5).

The Data Organization chart does not attempt to operationalize concepts into practical measurements. However, it does provide a logical foundation on which a total information system may be built. A total information system is "total" in the sense that it deals with all aspects of university data in a coordinated fashion. However, only relevant data are part of the total system.

The total information system consists of files of data and embraces all aspects of the design, acquisition, storage, and maintenance of data in coordinated files, and the analysis and retrieval of the data. It is, thus, a mechanic, a tool for effective management, not a substitute for good management. The total information system produces reports for administrators that aid in administrative decisions and enable the university to anticipate its future needs and plan accordingly. In addition, reports from many institutions may be pooled for planning on a state-wide, regional, and national basis.

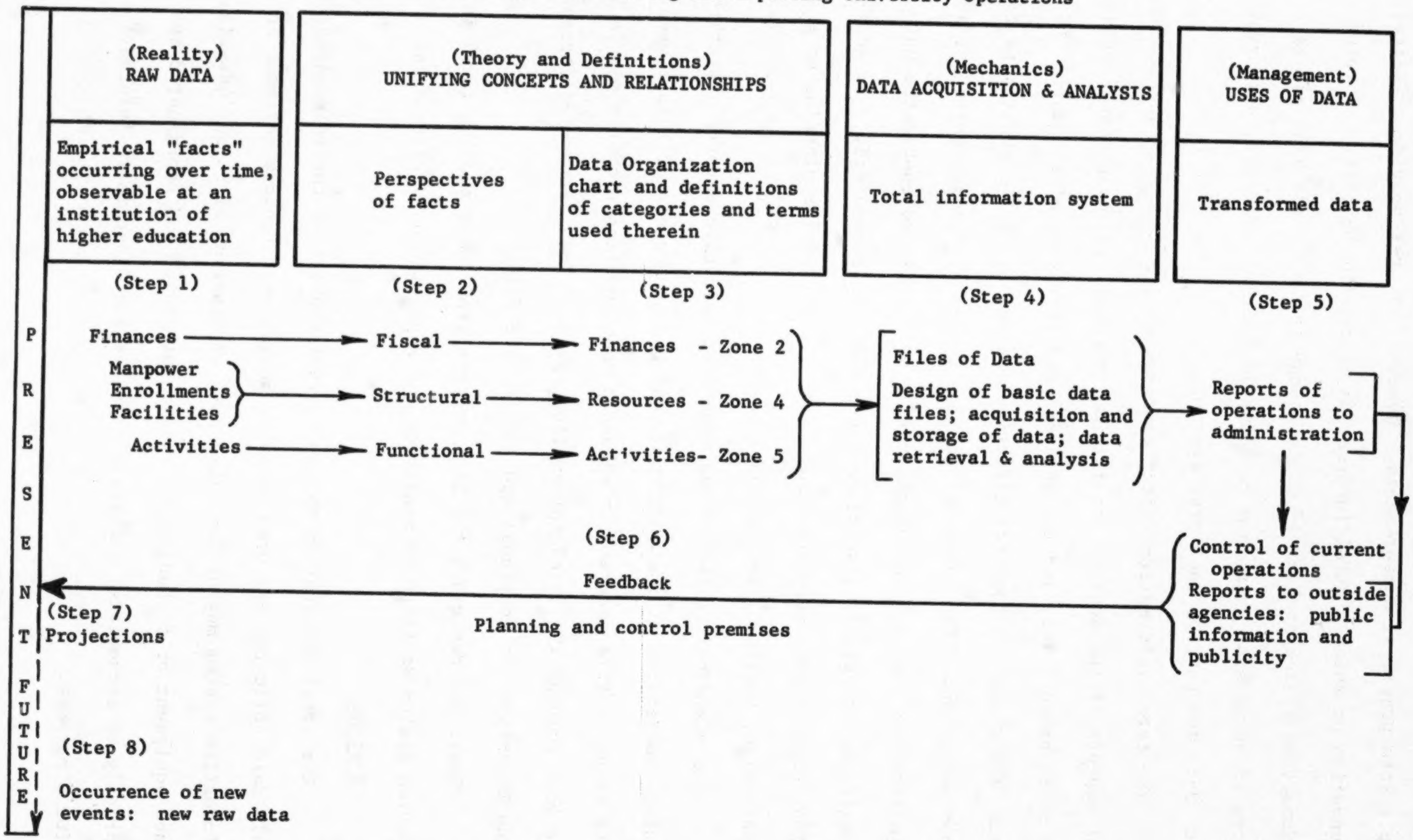
The planning premises based upon administrative reports affect the future operations of the institution and the occurrence of future events. The value of this feedback is enhanced when cognizance of the new facts is made through the total information system. This last point stresses the importance of continual updating of the data.

Chart 8-2 describes the Data Organization chart and the total information system as steps in measuring and reporting university data.

Systems

The total information system concept emphasizes the relatedness of all data collected and used by an organization. Broadly defined, an information system may be described as a combination of human, material, and equipment or technological events integrated and coordinated expressly to accumulate, integrate, analyze, and disseminate information for a purpose.

Chart 8-2. Steps in Measuring and Reporting University Operations


(Reality)
RAW DATA
Empirical "facts" occurring over time, observable at an institution of higher education
(Step 1)
(Theory and Definitions)
UNIFYING CONCEPTS AND RELATIONSHIPS
Perspectives of facts
(Step 2)
Data Organization chart and definitions of categories and terms used therein
(Step 3)
(Mechanics)
DATA ACQUISITION & ANALYSIS
Total information system
(Step 4)
(Management)
USES OF DATA
Transformed data
(Step 5)
P R E S E N T
Finances
Manpower
Enrollments
Facilities
Activities
Fiscal
Structural
Functional
Finances - Zone 2
Resources - Zone 4
Activities- Zone 5
Files of Data
Design of basic data files; acquisition and storage of data; data retrieval & analysis
Reports of operations to administration
Control of current operations
Reports to outside agencies: public information and publicity
(Step 6)
Feedback
Planning and control premises
(Step 7)
Projections
F U T U R E
(Step 8)
Occurrence of new events: new raw data

This definition deals only with information, a special kind of system. Since it is possible to talk about a system as a tangible organization, it is important to distinguish at all times between information relationships and tangible organizational relationships.

A total information system is an integration of several information subsystems that handle routine matters such as payroll, registration, grade reports, etc., as well as to process data relating these on a daily basis. In addition, it provides reports for administrative officers from which they learn about current operations. The latter is most important from the viewpoint of management: information about current facts is essential to good administration.

Administration

Administration begins after the formulation of general objectives and broad policies of an institution. This formulation is accomplished by societal pressures, the governing board of the institution, its charter, by-laws, and traditions.

Administration is the action involved in realizing the general objectives and broad policies of an institution. Administration includes setting specific goals that represent practical transformations of the broad and the general. Setting specific goals and selecting means for reaching them are parts of the planning phase of administration. Planning is an element of administration that is the effect of principle and process. It is based on facts, in scientific management, which are obtained by careful investigation. From these facts, predictions are made, and from empirically based predictions, plans are formulated.

The purpose of planning is to secure systematic action in accordance with the general objective and broad policy of the undertaking. It takes effect in control. Both planning and control deal with future events in contrast to information systems that emphasize past events and must await the occurrence of new facts that will become raw data.

The most important uses of data produced by a total information system are those on which administrators base the internal control of current operations. Such data inform the administrators about the effectiveness with which their policies and plan of operation are carried out; they also furnish further facts from which new planning and control may be effected. Simultaneously, continual reports of current operations provide a basis of optimal coordination of daily activities that must be performed by the institution.

The relationship of information systems to administrators, then, is essentially one of continuous feedback. Administrators are kept informed about current operations and thereby they are able to plan for and control future operations. An essential action that is part of these broad operations is decision making which, obviously, is best done when an optimal amount of adequate, relevant information is available.

Managing Information

The management of information is ultimately the responsibility of top administrators. Top levels of administration must establish priorities within the data system, decide what information will be generated and maintained, to whom it will be distributed, in what amounts, and at what times.

The information system, then, must be optimum for the entire organization, not ideal for any single department, whether it is engaged in scholarly pursuits or supporting services. The system must aid in planning for and controlling the total organization. Top administration must give priorities to elements within the system that reflect the purposes of the institution. The system must be built by people who have the perspective of the institution as a whole.

The highest levels of administration have the task of translating data into information. By giving meaning to data, by transforming symbols into usable forms, and by relating their meanings to lower levels, effective management can take place. Top management, through a total information system, can furnish information to lower levels. The best system for any institution is one that transmits information to lower levels and, in turn, provides feedback to the highest levels.

Feedback is essential to effective control and coordination. It provides verification for plans formulated in the past, the effectiveness of which cannot be known until events unfold. It provides knowledge about outcomes resulting from past decisions and allows for new decisions to be wisely formulated.

Other Uses of Data

Another set of uses of data provided by a total information system consists of reports to outside agencies. These reports, emanating from the institution's administrators, not from those who operate the information system, may be pooled with similar reports from other institutions for planning on a state, regional, and national scale. To pool data requires the data to be in compatible form - a consideration that urges some standardization in reporting data, the basis for which may be provided by the Data Organization chart and its definitions.

Yet another set of uses of data is aimed at the public. It occurs as publicity releases and public information. Reports of selected data are directed toward alumni of the institution to gain their support. Other forms of information dissemination about institutional activities encourage good public relations.

Recommendations

In consideration of the fact that colleges and universities must organize their institutional data in a manner capable of meeting increasing demands, internal and external, for accurate and current information, it is recommended:

1. That cognizance be taken of the need to relate the people, facilities, activities, and financial capabilities of an institution to the specific purposes of the institution and to the over-all social contribution to be made by the institution. The conceptual "model" of the institution, resulting from the interrelationships so obtained, should be basic to the actual organization of institutional data.
2. That the organization of institutional data be based upon a coherent pattern of data gathering and processing that is consistent with the operation and structure of institutions. One method for constructing such a pattern, as well as for displaying the interrelationships referred to above, is visually represented by the Data Organization chart.
3. That, as part of the constructing of a coherent pattern of data gathering and processing, particular attention be given to the matter of relating institutional resources and institutional activities. In this connection, the classification and definition of institutional activities are especially important. A classification structure is discussed briefly in this chapter, and both the structure itself and a set of

related definitions are detailed in Chapter 13. They are offered for examination and, after suitable refinement, for possible adoption by institutions.

CHAPTER 9

TOTAL INFORMATION SYSTEMS FOR COLLEGES AND UNIVERSITIES

SUMMARY

Preceding chapters have been concerned mainly with the conceptual interpretation of various college and university resources and activities, with techniques for obtaining information about these matters, and with the organization and interrelationships of the information thus obtained. This chapter is concerned with the problem of describing an operational method for combining and integrating such information.

In attacking this problem, the discussion is directed toward the management information needs of colleges and universities. With this orientation, the total information system concept is translated into an over-all framework for describing the interrelationships of the operating systems that would be required to develop a working complex of the various systems that are the subjects of previous chapters.

Together with the supplementary materials in Chapter 14, this chapter suggests guidelines for the development of an over-all operating system. These guidelines are recommended to others for use in the development of such systems as are in accord with the needs and resources of different institutions.

Overview of the Total Systems Concept

In seeking better utilization of college and university resources, academic administrators have considered and, in many instances, adopted techniques characterized by rigor and quantification. Increasingly, decisions are based on systematically obtained data which are often subjected to quantitative analysis. Although one cannot now determine the extent, or permanence, of this approach to the administration of colleges and universities, the emergence on numerous campuses of institutional research and large-scale data processing installations are evidence of this trend.[1]

This approach to administration requires accurate, reliable information about an institution's resources, current operations, and future programs. The preceding chapters of this report are devoted to techniques for obtaining such information. This chapter describes an operational method for combining and integrating information generated from all sources in a college or university.

A university can be described as composed of a number of internal systems, such as the instructional system, research system, library system, accounting system, and other systems. When one views the total institution as a single unit, encompassing all its activities, one is viewing the organization as "total systems."

Within and for each internal system, data are generated and processed into reports to produce an information system. Information systems, when merged to aid in the administration of the entire organization, become a "total information system." Total systems is the general set of broad functional and operational units making up the whole, whereas total information system is a set of specific data and operational tasks or devices providing measurement and analysis of the whole.

---

[1] Francis E. Rourke and Glenn E. Brooks. "The Managerial Revolution in Higher Education." Administrative Science Quarterly, September 1964, pp. 154-181.

The total systems concept applies to the over-all administration of an organization. Much misunderstanding of the term "total systems" stems from applying it to a part or parts of an organization rather than to the whole. For example, it is incorrect to speak of the total system for a department because the problems, decisions, and solutions affecting a single department are only a small part of those affecting the entire organization. What to one department seems to be a total system, in reality, is a subsystem of the whole.

Similarly, the total information system deals with the entire organization rather than with fragments of it. A review of the individual words - total, information, system - as they are used in combination, reveals the scope and depth of data collection and the quality and kinds of information implied in this approach.

"Total" suggests that all areas requiring control, evaluation, and decisions are continually dealt with. This does not mean that all possible data about a college or university should be collected. It is well to recognize that "an efficient scheme for obtaining facts depends on balancing the cost of having facts available - either too many or too few - against the benefits that can be derived from having the necessary facts when they are wanted."[2]

"Information" connotes measurements and descriptions that are understandable, relevant, timely, and accurate. Information is derived from data. Data represent collected raw facts, whereas information denotes data that have been transformed into compilations, catalogs, displays, and reports needed and wanted by administrators. "Needed," as used here, refers to that information which is required in routine and established operations, and "wanted" implies special (perhaps one-time) information for evaluation and planning. The latter reports are particularly important because the information wanted by an academic administrator for decision-making concerns future probabilities affecting the institution rather than past developments and static facts about which he may be well informed.

---

[2] Robert H. Gregory and Richard L. Van Horn. Automatic Data Processing Systems, 2nd Edition. Belmont, Calif.: Wadsworth Publishing Company, 1963, p. 3.

"System" is used to describe an organized plan for originating and maintaining the data; manipulating or processing the data according to prescribed plans; and producing an informational output of routine documents, information reports, and analyses of problems. The plan includes the relationships between the elements of data and the details of the organizational structure that combine the component parts of the system, namely, the people, the equipment, and the procedures.

To summarize, a total information system is a functioning, organized plan that furnishes for all areas those facts needed and wanted by administrators for effective operation of the institution. The following definition was developed in the Project: The total information system is a linked network of raw facts (data), processed data (information) the collection of data, the development and flow of information, the manual and automated procedures which make the network operative, and the organization that coordinates and operates the network, all of which are designed to aid in the operation of a college or university by providing the information needed at all administrative levels for control, evaluation, and planning.

Elements of the Total Information System

Essential Conditions

To achieve a workable total information system, three principal conditions must be met:

1. The coordination of all administrative activities and the establishment of decision-making policy that takes into consideration the over-all institution without regard for the barriers of organizational segments or departments.
2. The collection of all data needed for the operation and management of the institution at the points of origin in a manner that will avoid duplication of the collection effort.
3. The recording and processing of data in a relatively fast, efficient manner, using manual or automated techniques or both.

Data processing equipment is not an absolute requirement. It is the sheer size of contemporary educational institutions, measured in terms of the amount of information they handle, that brings data processing equipment into the picture, and makes it a desirable condition. Machine processing offers the speed required in assimilating and reporting the information which facilitates the decision-making process.

Since the fundamental purpose of a total information system is to aid decision-making, the interest and involvement of academic administration are essential. Otherwise, no amount of effort on the part of workers and technicians can develop a workable system. Management data and data processing have historically cut across organizational lines and this will be even more pronounced in the operation of a total information system. Thus, the coordination of all administrative activities becomes increasingly significant. This coordination cannot be overemphasized and must come from the top down.

The collection of all needed data close to the points of origin and without duplication is required for several reasons. First, the collection of data close to the points of origin makes it easier to insure accuracy and makes the data available for use in the entire system at the earliest possible time. Second, systems analysis and design for the development of a total information system, alone, cannot bring about a major reduction in the number of functions or operations that are required to run an organization.

The major avenue for systems improvement and efficiency will be elimination of the duplication of data, reduction of the number of times that data must be transmitted, and improvement of the form in which information is displayed. Duplication results in a proportional increase in the efforts required for the collection, maintenance and updating of data. These increased functions, in turn, add to the expense of operation. Finally, duplication tends to make impossible the objective of coordination of all administrative activities.

Efficient storage and processing of data requires that a datum be maintained once and only once in the system. Also, there must be complete ability to cross reference and interrelate all the data of the entire system.

Types of Data

Data for input into the data processing programs and procedures that make up a total information system can be classified in several ways. A fourfold classification is presented here. The four types are

Operational Data, Historic Data, Special Data, and Control Data.

Operational data are those data generated by day-to-day operations or data subject to frequent change. An individual's address is an example.

Historic data are those data recorded for purposes of identification or description and are not subject to change. An example of historic data is the educational background of a faculty member. A past event, it is not subject to change and needs to be recorded only once.

Special data are those data that have no natural place to be collected in the organization and are likely to have one-time use. For example, experience data over and above those required for an employment application will normally become additions to historic data. Perhaps, after recording the experience of a university faculty member, it may be desirable to add to the store of data relating to previous positions, e.g., whether they involved work related to a particular subject, such as health or water conservation. This type of data is classed separately because a dynamic total information system would need to be able to add data to existing records without going through the process of redesign.

Control data includes all standards, forecasts, and decision rules an operation is expected to follow, and essentially consists of only those items required for review and decision.

Specific Items of Data Needed

The data collection and maintenance requirements of an institution are as broad as its objectives and scope of operations. The need to record specific data will be determined by the type of operating practices and procedures, audit and legal requirements, control methods, and the analytical techniques used in planning. An analysis of the objectives and operations will result in the delineation of major areas (major systems) of required management information. Analysis of each major area will, in turn, result in still further subdivisions (subsystems) of information. A detailed study of all the subsystems that will make up the total information system will determine the over-all data requirements that will be necessary for building up information reports. In short, a specific data need cannot be substantiated except through some known ultimate use.

Points of Collection

Most required data will be specified by the tasks that must be carried out in order to operate an organization. In a college or university, some of the tasks are to admit students, register students, meet classes, record grades, purchase supplies, record expenditures, and pay personnel. When planning and developing a total information system, the design problem is to determine what data should be systematically recorded. This determination is based on the need of a datum for a particular operation, and for some future operation or information analysis.

Definitions of Data Elements

Much of the data required for a total information system is currently available, but differences in form and storage have made it impossible for the data to be interrelated and cross-referenced. Furthermore, differences in terminology have been confusing to those supplying information and those who need it. Precise and complete definitions of all data are prerequisites of effective communication among those concerned with the development and utility of a total information system. In the case of numeric data, definitions must explain how numeric units are defined and whether the definitions are consistent over time so that comparisons between different periods can be made. If all definitions are understood by both those who operate the information system and those who use its reports, a system can be designed that will provide for maintenance of each item of data once and only once and for the systematic recording of all needed data near the source of origin.

Codes

A code can be defined as a system of elementary symbols (digits, letters, etc.) and of the rules for using symbols to represent data. Codes and classification systems are employed in data representations to reduce bulk and to improve the ability to manipulate or process data. A computer can make comparisons and computations using narrative words and phrases; however, such operations are inefficient because they require extra programming efforts and excess computer time. In the data representations for a total information system, a single code system is needed for each class of individual items or things for which data are collected. In a university, a single code system is needed for faculty and staff, a single code system is needed for students, and a single code system is needed for facilities. The use of a single code system for each entity through the entire system will simplify maintenance of data and is necessary for mechanical methods to relate and cross-reference facts concerning a single entity that are in different storage areas of the total information system. Some of the other code systems required by a university operation are building and room codes, course codes, accounting codes, and inventory item codes.

Frequently, several coding requirements can be combined into a single code system. An organizational unit (division, school, department) code and function code of the various organizational units is an example of combining coding requirements.

Many established coding systems can be adopted in a total information system. Social security codes and vehicle license codes are two systems that should be considered. The use of social security codes to identify students and faculty and staff can be particularly significant because it eliminates assigning codes and facilitates the maintenance of permanent history records. (A returning student or employee will always have the same social security number.) The use of a single code system for both students and employees will greatly simplify the collection of data in cases when an individual is both a student and staff member or when a student graduates and becomes a staff member.

Records and Files

The organizational build-up of data in a data processing system is as follows: Characters are grouped to make up a data element or field; data elements make up records; and like records compose files. A record is a set of facts closely related in the sense that they pertain to the same entity (individual, item, or thing). A file is one or more records handled together for processing.

The records of a total information system should be designed by using an open-end approach. This means that the individual record length should not be rigid, i.e., not limited to the 80 or 90 columns on a single punched card. Records should be so designed that data to meet new reporting requirements can be added to established records without redesigning the system.

Reports

A report is the planned output of an information system. Internal reports are of two general types, operating reports and control reports.

Operating reports are routine documents required in day-to-day operations and decision-making. As defined here, operating reports do not include any reports that involve control data.

Control reports involve explanation or analysis and interpretation of data. The most notable example of control reports used today is the exception report. The exception report lists only those items outside a pre-set range of acceptable agreement. It can assist management by reporting only those items that require review and decision.

Methods and Techniques

Creativity and imagination should be used in system analysis, evaluation, and design. The aim of the systems designer should be to exploit the advantages offered by data processing equipment and management science. The analysis of reporting requirements should include the origin and purpose of the ground rules. Frequently, this analysis will reveal some rather arbitrary rules that hinder the development of an efficient procedure.

Data Processing Organization

Three principal types of data processing organization exist - the centralized data processing facility, the decentralized facility that has centralized control, and the decentralized autonomous facility.

The central data processing facility can best serve a total information system. Inputs to and outputs of the system may be located in outlying or satellite locations. The principal advantage of the central data facility is that it will permit, by pooling all data processing needs, the employment of bigger and more sophisticated equipment and better coordination.

A decentralized data processing facility, though generally less effective, can be successful when there is single management and coordination. Decentralized autonomous data processing facilities involving the same entities (e.g., a separate facility for registration and a separate facility for business), in general, will not allow the development of a total information system.

Planning for a Total Information System

To be successful in the design and development of a total information system, one must be more than a data processing hardware expert. One must be a profound and devoted student of management.

A previous report, from the field of business, listed five basic steps to improve the processing of information. They warrant repeating here.

1. Establish the long-range objectives and then work out a basic design for an information system that will enable the business to operate more effectively and at lower cost.
2. Analyze and define the information system currently in use.
3. Make short-range improvements in the existing system which are consistent with the long-range plan.
4. Establish a time schedule and assign responsibility for attaining the long-range objectives.
5. Accomplish the plan.[3]

Any effort to develop a total information system must be deliberate. The plan must be sanctioned by the top executive officer; it must completely outline the objectives of the proposed information system; it must provide for the complete coordination of all administrative procedures; and it must assign responsibility for the development and operation of the system.

---

[3] Marshall K. Evans and Lou R. Hague. "Master Plan for Information Systems." Harvard Business Review, January-February 1962, p. 93.

Information and University Management

Many of the ideas about an over-all system of information presented thus far have been drawn from the experience of business and industry. There is no unanimity of opinion on how to transfer these ideas to universities. To facilitate consideration of how the adaptation of industrial experience to university problems might take place, a general discussion of university management follows.

Management as Related to Goals and Operations

Effective management implies a comprehension of goals, both short-range and long-range, an understanding of operations and of the components of these operations, and the existence of a set of standards for measurement of performance. In the most absolute sense, effective management is dependent upon complete knowledge of the nature and substance of that which is being managed. Designing a scheme of information for university administration depends in part upon the clarity of these concepts.

Goals may be stated in terms of enrollment figures, total budgets, salaries of faculty, or numbers of buildings. Clearly, an information system will provide this information to the administrator. Other goals that are more important, however, are those that compel an administrator to decide, for example, in favor of constructing a nuclear reactor instead of a library, or adding faculty in psychology rather than in machine design. Still other kinds of goals are those that lead an administrator toward the alteration of funding sources, of curriculum content, or of teaching-learning practices.

The more important goals that require decisions imply a comprehension of the place of education in society, of the contribution made by the university to its culture as well as to individual students, of the changing nature of knowledge, and of many other concepts which at this time are not susceptible to numerical yardsticks and may not be found in the ordinary information system.

Similar observations can be made concerning operations and analyses of performance. It is one thing to make decisions that are appropriate to improvement of operations, such as registration or classroom assignments. But to make decisions pertinent to advancing learning rates, to dividing time between laboratory and lecture, or to assigning research professors to teach freshman subjects is quite different. Analysis of performance, either to achieve operational improvement or to alter quality of output, depends upon one's concept of the process, of the dominant elements that control the process, and of the standard measurements that can be made. These matters are not yet susceptible to numerical measures.

It is possible to devise an information system that will reduce present operations to better management. It does not necessarily follow that these are the most appropriate operations for the university or that their improved management will achieve what should be the university goals. However, the immediate result will be better organization and control of that now being done, which, of itself, is a necessary and desirable first step.

The conclusion from these observations is that, at present, the university information system cannot be related to goals entirely, because the nature of goals is still being clarified. Nor can the information scheme be tied to operations entirely, except as operations may be viewed as actions in process of evolution. The proposed information system will, it is hoped, permit a more complete description and measurement of what is occurring so that goals can be better defined and operations can be more effectively designed.

The University System

It would seem desirable, therefore, to consider the nature of systems and of the university in more detail. In one's knowledge of any system, one passes from a completely empirical to an ordered understanding, by learning how to make measurements on the system. Preceding measurement is an era of description. Following from measurement is an era of model construction, with accompanying analysis and synthesis which lead to improvements of measurement, to elucidation of new parameters, and to refinements of models. These steps culminate in controlled use of the system and in synthesis of action to produce desired system changes. It may be instructive to view the university system problem in the light of this cycling sequence - description, measurement, model, analysis, and synthesis.

With respect to what is known about university systems, there is real question as to whether the model construction era is at all close at hand. Some parts of the university system are beyond description and well into measurement; for example, in the matter of finances and facilities, enough is known about their general characteristics to express them quantitatively. The conclusion seems inescapable that different components of the university system are at different stages along the road toward the development of analysis. So far as an average can be struck, the total seems to lie at some point between the description and the model-formulating stages. Wherever the point may be, an efficient scheme for collecting and communicating information should assist in this development, and this is one of the basic reasons that an information scheme for a total university system is desirable and imperative.

The usual approach to the university system is to identify students, faculty, facilities, research contracts, courses, etc., as internal components. It is somewhat more basic to identify functions or activities, usually given as teaching, research, and public service. All of these elements need to be related within a single model. More important, it is necessary to portray adequately what is accomplished by the interrelationships of elements in terms of output from the system and what is required as inputs to the system.

At the heart of the university system are such programs as teaching and research which, regardless of their form, are involved with one or both of two processes - the development of knowledge and the development of people. The development of knowledge includes its discovery, its processing and assimilation into the existing body of knowledge, its display and its dissemination. The development of people involves the identification of the individual and his intellect, his exposure to knowledge, and his creative development. Between these two processes there is a continual exchange at all points, i.e., in the activity of developing the individual, knowledge may be discovered or processed, and vice versa.

University programs are portions of one or both of these processes or some exchange between them. Many of the entities for which data are needed are units in one of these processes. It is fundamental to the understanding of the university system, however, to realize that central to all of its programs is the flow of knowledge and/or the development of individuals.

University Operations

The programs of a university are carried on through its operations which, along with its subsystems, must be identified. However, until the system is completely understood, the identification of its subsystems and key operations should be tentative.

Many university operations are housekeeping operations, unrelated to program operations or to the effectiveness with which educational goals are achieved. For example, the registration of students is an operation that can be improved and made more effective to the degree that it costs less, takes less student and faculty time, and provides a more compact set of schedules and classes. These things, however, do not necessarily contribute to the primary goals of university programs.

On the other hand, the operations for determining which classes a student ought to take, which professors will create the optimum situation for the student, which matching of students to classes or assignment of classrooms will produce the optimum learning environment are all germane to the educational process. It is entirely possible to optimize the registration and class scheduling process to improve the housekeeping operations or to improve the learning environment, but the two may not necessarily be optimized together.

Operations, then, are of two types - housekeeping operations and program operations. The former may be eliminated as more is learned about the total system. Program operations cannot be eliminated, but they may change in form as programs change, as the processes become better understood, or as different couplings of the university processes are undertaken.

The program operations are of maximum import, so far as the quality of a university is concerned. It is toward these operations that the information system should be directed most fundamentally, even though most of the raw data originates during the housekeeping operations.

Some Specific Needs in the University

Before much progress can be made toward devising a total information system useful for university management, there are steps which must be taken to fill some specific needs outlined in the preceding discussion.

First, some model or blueprint should be agreed upon so that the steps that are made will have some relevancy to a master plan and to each other. A few facets of such a model have already been suggested. However, a more complete and detailed model should be developed and kept up to date as understanding proceeds.

Second, definitions are fundamental. These definitions must have some precision, but they do not have to be perfect. At the early stages, it is better to accept a definition, arbitrary though it may be, and proceed to describe and collect information according to the definition than it is to swelter over the exactness of the term being defined. Relationships and orders of magnitude are important in the beginning - not fine structure. Even at the early stages, the information system should be internally consistent, and a definition accepted for one phase - say, budgeting - must apply equally to another phase - say, accounting. Definitions do not need to be standardized between particular information systems at the beginning, but ultimately such standardization is a goal.

Third, program activities must be identified. Many of the activities in which students or faculty members are engaged are not recognized or recorded. The counseling which a faculty member does, for example, as a matter of interest in a student or because of his social contacts with him, does not appear in the program scheme of the university. Many of the activities to which a faculty member addresses himself are not readily measured and hence may not be recognized.

The need for program definition and analysis cannot be over-emphasized. The units of the programs must be known, their purposes must be understood, and the involvement of both student and faculty assessed. Unless order can be assigned to programs, there is little hope of having an effective information system because there will be no way of defining what is done or who is doing what.

Fourth, there is a need to recognize that many classes of data are involved and that the data are not hierarchical in nature. Definitions and measures should not try to force data into the hierarchical form. Characteristics of students as individuals can be measured and recorded as part of the information system. Students can also be measured as classes. There is no way in which the measurement of students as individuals will produce the measurements as classes, because the classes have characteristics which result from the interactions of students.

Likewise, one can measure equipment as individual items and also as assemblages such as laboratories. Concepts can be put together to make courses; courses are put together to make curricula; and curricula are put together (along with other elements, such as research) to make up programs. A single course may appear, moreover, in several curricula, or a piece of equipment may be a part of several facilities. It is necessary to identify, define, and measure all these types of information, because one does not follow from the other.

Fifth, there is a need to extract information reports from the system in a way that the university administrator can see the development of the sequence of steps from planning through reporting, for every major element of the system - e.g., finances, facilities, people, and programs. The administrator will create a demand and climate for better use of an information system as he becomes familiar with its outputs.

Information must be used, of course, to advance the system science and the system operations, as well as the system management. It is important, therefore, to develop the information system in concert with the activities of systems analysts, i.e., persons who are continually assessing the information, fitting it to a model or models, seeking possible new interpretations, and uncovering the need for new information to test new ideas. Without the analyst, the development of system understanding will not proceed, and the information will become more or less sterile.

The sixth specific need, therefore, is that the development of an information system should proceed simultaneously with systems analysis and operations analysis on the university. The efforts of assigned individuals should be directed to this task, because it will require an organized and full-time effort. The administrator will gain his perspective largely to the degree that the analysis of the university system and its operations has been able to keep pace with the information development.

Thus, the matter should be viewed, at present, in the perspective of a research and design problem, not in the perspective of an accomplished routine. Whatever is done by a university to establish an information system and to serve management needs thereby should be done with a research and design viewpoint. It will be necessary to carry on existing routine operations while the new design is proceeding, but routine and standard ways of doing things must not be allowed to negate the research nature of the information approach. In the transition stages, therefore, it will be more expensive to manage through a total information system than without it. In the long run, the total information system should lead to better management per unit of expenditure.

Developing Major Systems of Data

In applying total information concepts to the university, considerable attention must be given to identifying activities, defining them, elucidating the roles that both faculty and students perform in each activity, and showing the relationship of individual activities to the total educational program.

A university's individual programs reflect a wide scope of subject matter, different faculties, and different approaches to education. The university system may not be susceptible throughout all its parts to the uniformity, consistency, and other attributes discussed earlier as desirable for information. This should not be an insurmountable barrier to the realization of a total information system. It could mean, however, that individual colleges (e.g., engineering, science, agriculture) rather than the total university will become the basis for storing certain data within the system.

The Major Systems

The first step in producing a workable information system is to identify divisions of the information system, or major systems, by which the university information can be organized. As stated earlier, these major systems should be related to management information needs, which will have some direct relationship to the operations of the organization.

The division into major systems might be done in several ways. Divisions could be related to the organizational structure of the academic units; they could be related to the responsibility areas of university administration; they could be based upon operational functions; or they could be related to the over-all programs of the university.

The major systems resulting from a division based on organization could be Arts, Science, Engineering, Medicine, Agriculture, and other

5

academic units. This has an advantage only to the extent that there are unique operations or programs that cannot be interrelated. However, faculty members may cross several academic units and interdisciplinary efforts are currently the trend. This approach does not seem to be consistent with centralized administration or with the idea of unified educational programs, and will not be considered further.

The major systems that related to top staff administrative assignments could be Programs (usually Academic, Research, and Continuing Education), Operations, Resources, and External Relations. This division has some of the same shortcomings of the division by academic organization. It is an improvement because it implies more unification. However, it does not adapt itself to a clear allocation of specific data files in the information system. In addition, Operations and External Relations do not have the same kinds of make-up as do Programs and Resources, so that it is not easy to see how the major systems might be interrelated.

The division into major systems based on operational functions would yield Admissions, Registration, Student Records, Accounting, Budget, Personnel, Inventory, and others. This kind of division is not desirable, because data to be maintained in only one location cannot be the possession of a single functional unit. The maintenance of data in the basic files will be a part of some particular operational function like registration; however, the data must belong to, and be transferrable, throughout the total system. Furthermore, it is not possible to enumerate all the operations even now, and new areas will certainly be added. The number of major systems would possibly be very large under this scheme. These operations are more properly thought of as subsystems or procedures.

Major systems based on resources and activities that interact to achieve the goals of the institution are Manpower, Students, Facilities, Finance, and Activities. (These major systems correspond to Zones 4, 2, and 5 of the Data Organization chart.) This study has concluded that this division is the most logical and justifiable. It relates the basic data files to resources and activities rather than to operational functions. These major systems also are more closely aligned to the conditions that are essential in the development of a total information system, namely, the coordination of all administrative activities and the collection and maintenance of data at their points of origin without duplication. Finally, they include everything within a small number of reasonably well defined limits.

In a total information system divided into the major systems of Manpower, Students, Facilities, Finance, and Activities, the principal activities are identified as Instruction, Research, and Public Service. The principal resources or elements that are involved in producing these activities are Manpower, Students, and Facilities. Money is a resource which is directly involved in the procurement of facilities and manpower, but only indirectly involved in the activities.

File Design

Each major system will be supported by a number of basic data files, which, in total, will contain the data from which information reports and operational control can be generated. The focus of the file design is the area of activities. For each activity, it can be assumed that reports can be developed to answer the following questions:

1. What faculty and staff are involved?
2. What students are involved?
3. What facilities are being used?

4. What financial obligations are entailed?

5. What needs are being implemented?

The capability for answering these questions assumes that each activity in question is identified and defined so that the entire set of activities includes all the tasks or assignments which involve students, faculty, facilities, and money. Individual faculty, students, and facility elements must be coded so that each can be identified as it relates to each activity. All activities must be classified so that the relationship to faculty and facility can be established by code, and each financial transaction must be classified so that income and expense relationships also can be traced by code.

With current hardware developments, what is referred to as basic data files may become a division of a single record in a mass storage media, and the ledger-type documents may be replaced by data display devices. Even with this development, the points made here still apply. The scope of data presented by these files is intended to be representative of the minimum data requirements of a total information system. The files will cover data of four types - historic, operational, special, and control.

In each situation, the division of the total data pool into basic files will be based on the sources of the data, the uses of data, the frequency of data use, and the types of reports needed. Each basic file should have its separate collection and maintenance cycle. Each file should have its primary relationship to the other files of the major system in which it is grouped, but there will be secondary relationships to files in the other major systems.[4]

---

[4] For supplementary material on the basic data files supporting each of the major systems, see Chapter 14 (Section II).

The intent is not to duplicate data other than that necessary for the connecting links in the various files. The extent to which this can be accomplished will depend on the type of equipment employed. As a general rule, a magnetic tape or disk-oriented data processing system should be able to maintain this principle. In a card-oriented system, one will occasionally find it better to duplicate certain additional data elements (fields) rather than to collate individual files. Duplication of data beyond the connecting links should always be done with caution, because duplication adds to collecting, which increases costs, makes it more difficult to insure accuracy, and tends to destroy the objective of coordinating all administrative activities.

Operating Subsystems

The recognition of major systems and the design of basic data files only sets the stage for the actual use of the data files and the compiling of information. The development and flow of information, along with the automated procedures through which the flow is accomplished, take place in recognizable units of operations which, for convenience, are called subsystems. A given subsystem operation will usually occur within the bounds of a given major system, making use of the data files of that major system.

The subsystem will always be unique to a given university, because individual university practices, needs, and working conditions are variable. The loci for data collection will also be among the variables. Nevertheless, there are transferable ideas, procedures, formats, and programs.

One of the best approaches for arriving at a total information system is to originate subsystems which can be added cumulatively to produce a total system. However, an over-all blueprint should exist so that the growing subsystems will be compatible.

In the process of originating new subsystems, needs for new or combined basic data files will be apparent. Also obvious will be the need for codes, which will be brought into being as each new subsystem demands. There is no way to devise fully a system of codes before a subsystem is actually planned, although the general format may be laid out.

Cost of the Total Information System

A detailed plan for a total information system has not been set forth in this chapter, nor have actual experiences been available to report. Thus, any discussion of the cost of such a system and the elements that add to or reduce cost must be tentative. The cost of a total information system will be associated with the various phases of data and information handling - collection, maintenance, processing, transmission, and reporting, as well as the cost of systems analysis, design, operation, and the system facilities.

If duplication is eliminated in the collection, maintenance, and processing of data, and if the number of times that data must be transmitted is reduced, then the cost per individual datum will be reduced. On the other hand, if the system increases the accessibility and usefulness of information, then the total cost of the information system will, in all probability, be increased. If the computer can be used, not as a printing press, but to edit out all inconsequential information and call attention to the variances which require administrative decisions, then information will be more useful and all resulting increases in cost will be justified. The total information system, as an operating system, will be considered economical not because it has reduced costs, but because it will aid in solving problems and making decisions; because it will provide a record of past and present performance as well as to project performance, requirements, and needs into the future; and because it will do all these things with accuracy, on a timely and as-needed basis.

Establishing a Total Information System

Although the total information system described in this chapter does not presently exist in any college or university, many institutions are developing a combination of procedural and organizational elements in that direction. Moving from a few isolated procedures to a total system will require acceptance and support of the concept by the chief university administrative officer, and because many of them have not been made aware of the potential of such a system, progress may be slow.

As has been pointed out, to achieve a workable system the institution must provide for the central coordination of all administrative procedures so that institutional information needs can be considered without being limited by organizational barriers. This may also require a centralized and coordinated management of the institution's data processing facility.

To reemphasize various points previously made, as an institution proceeds to gather its procedures into a total information system, it should consider the following questions:

1. Does the institution have a blueprint of its desired information system?
2. Does the information system provide for the collection of all data at the points of origin and for

assemblage in files in a manner that will avoid duplication of effort?

3. Can the basic data files be grouped into definable major systems with recognized classes (or their equivalent), of operational data, historic data, special data and control data?
4. Is the information system based on specific definitions for all data and information in all major systems?
5. Does the information system employ a single code system for each class of entity (individual, item, or thing) in the system?
6. Can the information system produce a series of control and analysis reports in each major system in addition to routine operational reports?
7. Does the information system link the coordination of the entire system to institutional research and the development of new measures of quantity and quality? (Institutional research, as used here, is the deliberate effort of university administrators to understand the university process.)

It is not to be expected that universities will spawn full blown total information systems. It will take time to work out definitions and activity classifications on which good data collection can be built. There will be considerable flux and change in methods and procedures as the concepts are put into practice. The framework can now be seen rather clearly, however, and the achievement of the full potential of this approach as a management tool depends primarily on the willingness of administrators to set it in motion and to allocate the manpower and resources needed.[5]

Recommendations

It is recommended that, as colleges and universities explore the possibility of implementing the total information system concept, recognition be given to the fact that not only does the idea of an over-all operating system based on this concept offer great potential as a tool for effective management but that work on the application of this idea to universities is still in the developmental stage, with many practical problems yet unsolved. However, the guidelines, offered in this chapter and in Chapter 14, are recommended to others for use in the development of such over-all operating systems as are in accord with the needs and resources of different institutions.

---

[5] For an outline of some of the questions to be answered by a total information system, some of terms to be defined, and other related items, see Chapter 14 (Section III).

PART II

SUPPLEMENTARY MATERIALS FOR USE IN MEASURING AND REPORTING COLLEGE AND UNIVERSITY RESOURCES AND ACTIVITIES

CHAPTER 10

ACADEMIC/ACADEMIC-PROFESSIONAL PERSONNEL: SUPPLEMENTARY MATERIALS

I. General

The materials included in Sections II, III, and IV of this chapter supplement Chapters 2, 3, and 4 when these three chapters are looked up as one unified conceptual discussion about academic/academic-professional personnel. Specifically, Sections II and III, "Development of List of Maximum and Minimum Data" and "Development of Specialty Lists," supplement Chapter 2; Section IV, "Guidelines for Constructing an Activities Index As a Method of Computing Full-Time Equivalents of Part-Time Personnel," supplements a discussion of the same topic in Chapter 4. The contents of these three sections are the result of surveys, pilot studies, and coordinated staff investigation within the Project Group.

It may be noted, however, that one of the most active areas of pilot testing on manpower problems was (1) in the selection and definition of academic/academic-professional activities (Chapter 3) and (2) in the measurement of these activities, i.e., time versus effort (Chapter 4). In regard to both of these problems, much of the testing was done via faculty activity reporting forms which were evolved and changed to suit each experimental situation. No such forms are reproduced in this report because comparable forms are in fairly common use. What is important, of course, is the content, and this has been provided in Chapter 3, namely, the ten major categories of activities, together with definitions, plus the recommended approach to the measurement of these activities in terms of percent of total effort as discussed in Chapter 4.

This chapter, therefore, offers only those supplementary materials which are both unique and necessary to the implementation of the concepts discussed in previous chapters on manpower.

II. Development of List of Maximum and Minimum Data

Procedure

The items which appear on this basic list of manpower data were derived from an examination of forms used by universities to record facts about academic/academic-professional manpower. In the survey requesting these forms, all members of the Council of Graduate Schools in the United States (195) were canvassed, with 148 responding.

After the basic list was compiled, it was examined by representatives of the institutions within the Project Group and by representatives of agencies outside the Group. The maximum list was then revised and a minimum list developed.

Items which are included on the minimum list are indicated by an asterisk. The amount of information and the extent of detail collected and maintained for each item varies from one institution to another, and depends, in part, on the size, type of control, and special purposes of a particular institution. The data are expected to originate from several institutional sources, as appropriate, and not merely from individual staff and faculty.

The criteria for the selection of each item for the minimum data list are its value for (a) the conduct of day-to-day operations, (b) internal analysis and long-range planning, and (c) fulfilling the information requirements of outside agencies. The first criterion was used most frequently. The frequency of use of the other two criteria can not be indicated with any degree of reliability. In general, the second criterion was responsible for the selection of data that will enable an institution to conduct long-range planning in a fairly conventional manner and of modest magnitude. The third criterion was responsible for the selection of data that can be reported in aggregate and that will be amenable to statistical groupings and analysis.

Small schools appear to need about the same kinds of data as are needed by large schools, although it is recognized that small schools may not be able to afford the collection and processing of many kinds of data. However, the minimum list includes data that are basic in the sense that they can not be further subdivided, as well as data that are not adaptable to subdivision but were considered so important as to exclude other data of slightly less significance.

These observations suggest that no list of data can be autocratically prescribed. Even a "minimum" list must provide for further selection by individual institutions.

List of Maximum and Minimum Data

PART I. BACKGROUND, QUALIFICATIONS, AND EXPERIENCE

A. Personal Data

*1. Name, including maiden name if married woman

*2. Social security number

*3. Present address (and)
    a. Length of time at present address
    b. Own, rent, or board at present address

*4. Permanent mailing address, if different from present address

*5. Home telephone number

6. Business address, if part-time faculty

7. Business telephone number, if part-time faculty

*8. Office location at university

*9. Office telephone number and/or extension at university

10. Office hours at university

*11. Sex

12. Race[1]

*13. Religious affiliation[1]

*14. Birthdate

15. Place of birth

*16. Citizenship

*17. Naturalization data:
  *a. Place
  *b. Court
  *c. Date

*18. Data about aliens:
  *a. Port of entry
  *b. Date of entry
  *c. Type of visa
  *d. Expiration date of visa
  *e. Expiration date of passport
  *f. File number (Federal government)
  *g. Plans in regard to U. S. citizenship

*19. Marital status

20. Date of marriage

*21. Spouse:
  *a. Name (maiden, if wife)
  *b. Address
  c. College(s) attended
  d. Date of graduation
  e. Place of employment
  f. Occupation

*22. Children:
  *a. Names
  *b. Birthdates

23. Other legal dependents:
  a. Names
  b. Relationships
  c. Birthdates

24. Parents:
  a. Names
  b. Address(es)
  c. Occupation(s)
  d. Connection of parents with this university

---

[1] Institutional policy will determine requirement for this information.

25. Physical characteristics:
  a. General condition of health
  b. Date of last physical examination
  *c. Physical disabilities or handicaps
  d. Height
  e. Weight
  f. Color of hair
  g. Color of eyes

*26. Military and selective service status:
  *a. Selective service classification
  *b. Date of classification
  *c. Service veteran or non-veteran
  *d. Dates of military service
  *e. Rank (present or latest)
  *f. Reserve or National Guard status
  *g. If active in Reserve or National Guard, expiration date of obligation

*27. Relatives employed at this institution:
  *a. Name(s)
  *b. Relationship(s)
  *c. Position(s)

*28. Person to be notified in case of emergency:
  *a. Name
  *b. Address
  *c. Telephone number
  *d. Relationship

B. Educational and Related Data

1. Elementary school(s):
  a. Name(s)
  b. Location(s)
  c. Dates of attendance
  d. Date of graduation

2. Secondary school(s):
  a. Name(s)
  b. Location(s)
  c. Dates of attendance
  d. Date of graduation

*3. Undergraduate education (including pre-professional and 4-year first professional degree programs):
  *a. Name(s) of institution
  b. Location(s)
  *c. Dates of attendance
  *d. Date of graduation
  *e. Major field(s)
  f. Minor field(s)
  *g. Degree

*4. Graduate or professional education [including (a) professional programs leading to first professional degree requiring, in total, 5 or more years, and (b) programs leading to second and higher professional degrees]:

   *a. Name(s) of institution(s)
   b. Location(s)
   *c. Dates of attendance
   *d. Date(s) of graduation
   *e. Field(s) of study
   *f. Degree(s) awarded
   g. Title of Master's thesis
   h. Name of thesis director
   i. Title of Doctoral dissertation
   j. Name of dissertation director

*5. Postdoctoral education (including programs beyond the M.D.):
   *a. Name(s) of institution(s)
   b. Location(s)
   *c. Dates of attendance
   *d. Field(s) of study

*6. Postgraduate education (short or "special" courses, usually to update professionals, plus participation in other forms of continuing education):
   *a. Name(s) of institution(s)
   b. Location(s)
   *c. Dates of attendance
   *d. Field(s) of study
   *e. Workshops and institutes

*7. Fellowships:
   *a. Source
   *b. Purpose
   *c. Duration (dates)

*8. Professional registrations, licenses, certification:
   *a. Kind(s)
   *b. Area(s) in which professional practice is authorized
   *c. Date(s)

*C. Honors

*1. Type(s) of award or distinction

*2. Date(s) received

*3. Awarding institution(s) or organization(s)

*D. Professional Experience at Other Institutions[2] (for each appointment)

*1. Name of institution or organization
2. Location
*3. Position, rank, or classification
*4. Duties performed
*5. Duration (dates)
6. Salary

E. Professional References (for each reference)

1. Name

2. Position or title

3. Institution or organization

4. Location

*F. Record of Employment at This Institution[3]

*1. Date of appointment

*2. Rank and/or title of position

*3. Organization unit to which assigned

*4. Base salary

*5. Basis of payment (number of months)

*6. Type of appointment (percentage of full-time)

*7. Length of contract

*8. Tenure status

*9. Faculty voting status

*10. Source(s) of salary

---

[2] Institutional policy will determine the historical period to be covered in this record of employment at other institutions.

[3] As with other sections of this list, this record is to include all changes in data from first appointment.

*11. Withholdings:[4]

- *a. Federal income tax
- *b. State income tax
- *c. Local taxes
- *d. Social security
- *e. TIAA
- *f. CREF
- *g. Health Insurance plan
- *h. Major medical insurance plans
- *i. Life insurance
- *j. Other fringe benefits
- *k. Bonds
- *l. Savings
- *m. United Fund
- *n. Other charitable contributions
- *o. Fees
- *p. Dues
- *q. Room rent
- *r. Laundry

*12. Leaves of absence and/or sabbatical leaves:
- *a. Dates
- *b. Payment of salary
- *c. Purpose
- *d. Location during leave

*G. Travel

*1. Foreign countries visited

*2. Purpose of each visit

*3. Duration of each visit (dates)

*H. Professional Identification and Competencies

*1. Primary professional identification

*2. Secondary professional identification

*3. Teaching competencies:
- *a. Areas of current teaching competence
- *b. Areas of potential teaching competence

*4. Research competencies:
- *a. Areas of current research competence
- *b. Areas of potential research competence

---

[4] This list of withholdings is not exhaustive or selective, and will vary among institutions. Both maximum and minimum data requirements will reflect, of course, those items for which payroll deductions are actually made.

*5. Additional institutional activities for which one has competence

6. Geographic areas of special knowledge and competence

*7. Language attainments:
    *a. Name(s) of language(s)
    *b. Degree of proficiency in speaking, reading, and writing

*I. Publications and Other Evidence of Creative Achievement (Resulting from Application of Professional Talent)

*1. Completed books:
    *a. Names of co-authors
    *b. Title
    *c. Publisher
    *d. Date of publication
    *e. Number of pages

*2. Published articles:
    *a. Names of co-authors
    *b. Title
    *c. Name of journal or periodical
    *d. Volume number
    *e. Date of publication
    *f. Page numbers (inclusive)

3. Works in progress:
    a. Co-authors
    b. Description
    c. Date started
    d. Anticipated date of completion

*4. Films, recordings, radio and TV programs (data on participation as performer or producer)

*5. Drama productions and concerts (data on participation as performer or director)

*6. Art exhibitions (data on participation as exhibitor)

*7. Inventions (data on patents):
    *a. Description
    *b. Date patented
    *c. Patent number

*J. Membership in Learned and Professional Societies

*1. Name(s) of organization(s)
*2. Date(s) of admission
*3. Offices held, if any
4. Date(s) of holding office(s)
5. Paper(s) read

PART II. PROFESSIONAL ASSIGNMENTS AND RESPONSIBILITIES

*A. Teaching Assignments[5] (for each class)

*1. Course and section numbers

*2. Level

*3. Subdivision of course (lecture, laboratory, etc.)

*4. Enrollment

*5. Unit value of subdivision taught (or unit value of course if it is not subdivided)

*6. Term (fall, spring, summer, or equivalent)

*7. Days and hours of class meetings

*8. Location (campus, building, room number)

9. Teaching assistance

*B. Research Projects[6] (for each project)

*1. Descriptive title

2. Type of research

*3. Project number

*4. Contract or grant number

*5. Sponsor

6. Total funds

*7. Duration (dates)

*8. Discipline(s)

*9. Role of participant (principal investigator, graduate research assistant, etc.)

*10. Theses in progress (if graduate level):
*a. Title(s)
*b. Estimated date(s) of completion

---

[5] Special types of instruction not identified by course number and having no assigned unit value may exist in some institutions. In this case, sufficient identification and explanatory data to describe the assignment should be provided.

[6] These items pertain primarily to an individual's participation in sponsored research projects; for unsponsored projects, only items 1, 7, 8, 9, and 10, under B, will apply.

*C. Administrative Assignments

*1. Administrative unit

*2. Position or role

*D Committee Assignments

*1. Name of committee, including type, i.e., standing, ad hoc, or other

*2. Nature of participation

*3. Duration (dates)

*E. Student Relations Assignments (exclusive of committees)

*1. Student group for whom advice or supervision is provided

*2. Relationship to group

*3. Duration (dates)

*F. Public Service Assignments

*1. Types of service performed

*2. Dates

*G. Consulting

*1. Name of organization (Federal agency, industry, or other)

*2. Dates

PART III. DISTRIBUTION OF EFFORT[7]

*A. Percent of Effort Devoted to Teaching

*1. Credit-course instruction:
  *a. Terminal
  *b. Lower-division) Undergraduate
  *c. Upper-division)
  *d. Advanced professional
  *e. Graduate
  *f. Post-doctoral

2. Non-credit-course instruction

---

[7] The concept of "effort" is discussed in Chapter 4. Some institutions may prefer to use "time."

*B. Percent of Effort Devoted to Research

1. Classification:
    a. Basic
    b. Applied
    c. Development

*2. Sponsorship:
    *a. University-supported research
    *b. Externally-supported or "sponsored" research:
        *(1) Federal
        *(2) State agencies
        *(3) Private foundation
        *(4) Industry
        *(5) Individual sponsors
        *(6) Other

*3. Areas:
    *a. Health
    *b. Atomic energy
    *c. Space science
    *d. Defense
    *e. Agriculture
    *f. Other

*C. Percent of Effort Devoted to Teaching-Research[8]

(This category may be sub-divided according to any of the subcategories of "Research.")

*D. Percent of Effort Devoted to Creative Activity in Art and Scholarship

(This category may be sub-divided by type of sponsorship, if any, and by type of creative activity.)

*E. Percent of Effort Devoted to Teaching Through Creative Activity in Art and Scholarship

*F. Percent of Effort Devoted to Public Service

1. Consulting (that which serves the public interest)

2. Service on government committees

3. Service on professional community committees

4. Editing professional journals

5. Participation in accrediting procedures

6. Other

---

[8] See discussion of this concept in Chapter 3. If Teaching-Research is used as a separate allocation of effort, the percentage must not be included in Research or in Teaching. However, it may be combined with either of these categories for certain analytical studies.

*G. Percent of Effort Devoted to Administration

*1. General

*2. Academic

*3. Research

*4. Creative activity

*5. Supporting services

*H. Percent of Effort Devoted to Formal Personal Education

1. Formal course work toward Master's degree

2. Formal course work toward Doctoral degree

3. Formal course work toward other degree

4. Participation (as a student) in workshops, institutes, and other forms of continuing education

5. Work on thesis or dissertation:
   a. Master's
   b. Doctoral
   c. Other

*I. Percent of Effort Devoted to Intra-University Activities

*1. Working with student groups in an advisory or supervisory capacity

*2. Working on university boards and committees

3. Student counseling (other than that related to teaching)

4. Administrative staff work

5. University fund-raising

6. University public relations

7. Other

*J. Percent of Effort Devoted to Other Extra-University Activities (excluding Public Service)

*1. Consulting (for profit-making organizations)

*2. Other

III. Development of Specialty Lists

Procedure

When pilot studies at institutions within the Project Group revealed the inadequacy of existing specialty lists (except for scientific and engineering disciplines), the institutions began to develop such lists. Each institution was responsible for certain areas. A list was usually developed by the head of a department, either with or without consultation and advice from his faculty. With the exception of the health specialties, the lists are comprised of specialties within the arts and humanities and social sciences.

A five-digit code is used for these lists. The coding system and the lists are intended to be co-ordinated with those used in surveys for the National Register of Scientific and Technical Personnel (as of 1964). Wherever a specialty on one of the following lists has been taken from a list used with the National Register, it will bear the specialty code of the latter. Such items can be identified easily since they have four-digit codes.

Lists used by the National Science Foundation are prepared and revised by professional organizations whose members are scholars and experts within science and engineering. The lists on the following pages are, by comparison, a modest effort by a handful of people. They are imperfect and will require constant revision. Nevertheless, they may prove useful as a starting point for further development.

Specialty Lists

CLINICAL MEDICINE

General Medical Specialties

10001	Anesthesiology
10002	Dermatology
10003	Syphilology
10004	Infectious diseases
10009	Other (specify)

Internal Medicine

10101	Internal medicine
10102	Allergy
10103	Endocrinology
10104	Cardiovascular diseases
10105	Cardiology
10106	Gastroenterology
10107	Pulmonary diseases
10108	Renal diseases
10110	Metabolic diseases
10111	Arthritis
10112	Rheumatic diseases
10109	Other (specify)

Radiology

10201	Radiology
10202	Diagnostic radiology
10203	Therapeutic radiation
10209	Other (specify)

Obstetrics - Gynecology

10301	Obstetrics
10302	Gynecology
10309	Other (specify)

Eye, Ear, Nose, and Throat

10401	Opthalmology
10402	Otology
10403	Laryngology
10404	Rhinology
10409	Other (specify)

Neurology

10501	Neuroendocrinology
10502	Neuropathology
10503	Neurophysiology
10504	Neuropharmacology
10509	Other (specify)

Psychiatry

10601	Psychiatry
10602	Child Psychiatry
10609	Other (specify)

Surgery

10701	Surgery
10702	Neurosurgery
10703	Orthopedic surgery
10704	Pediatric surgery
10705	Plastic surgery
10706	Thoracic surgery
10707	Urology
10709	Other (specify)

Pediatrics and Geriatrics

10801	Pediatrics
10802	Geriatrics
10809	Other (specify)

Other Medical Specialties

10901	General practice
10902	Osteopathy
10903	Physical medicine and rehabilitation
10904	Preventive medicine
10905	Proctology
10906	Aviation medicine
10907	Tropical medicine
10908	Forensic medicine
10910	Industrial medicine
10911	Epidemiology
10909	Other (specify)

DENTISTRY, NURSING, VETERINARY MEDICINE AND OTHER HEALTH SPECIALTIES

Dentistry

11001	Anesthesiology
11002	Complete and partial dentures
11003	Crown and bridge
11004	Dental materials
11005	Endodontics
11006	Gerodonics
11007	Instrumentation
11008	Oral diagnosis
11010	Oral pathology
11011	Oral surgery, general
11012	Oral surgery, cleft palate
11013	Oral medicine
11014	Orthodontics, general
11015	Orthodontics, cleft palate
11016	Operative dentistry
11017	Pedodontics
11018	Periodontics
11019	Preventive dentistry
11020	Public health dentistry
11021	Radiology, roentgenology, x-ray
11022	General practice
11009	Other (specify)

Nursing

11101	Medical
11102	Surgical
11103	Pediatric
11104	Obstetrical
11105	Public health
11106	Psychiatric
11107	Rehabilitation
11109	Other (specify)

Physical and Health Education

11201	Athletic coaching
11202	Athletic training and conditioning
11203	Dance production and theatre performance
11204	First aid and safety
11205	Growth and development
11206	Handicapped, activities for
11207	Health concepts and programs
11208	Kinesiology
11210	Mechanical analysis of human movement
11211	Physiology of muscular exercise
11212	Physical education activities for children
11213	Recreation theory and programs
11214	Rhythms for children
11215	Tests and measurements in health and physical education
11209	Other (specify)

Public Health

11301	Chronic diseases
11302	Communicable diseases
11303	Community health agencies
11304	Environmental health
11305	Food Hygiene
11306	Meat inspection
11307	Milk and dairy inspection
11308	Occupational health
11310	Poultry inspection
11311	Public health administration
11312	Public health education
11313	Public health practice
11314	Sanitation
11309	Other (specify)

Clinical Veterinary Medicine

11401	Anesthesiology
11402	Cardiology
11403	Clinical pathology
11404	Dermatology
11405	Epidemiology
11406	Fur bearing animal
11407	Hematology
11408	Laboratory animal
11410	Large animal
11411	Neurology
11412	Obstetrics
11413	Ophthalmology
11414	Poultry
11415	Radiology
11416	Reproductive diseases
11417	Small animal
11418	Surgery, general
11419	Surgery, neurosurgical
11420	Surgery, ophthalmic
11421	Surgery, orthopedic
11422	Surgery, other
11423	Terapeutics

11424	Zoo animal
11409	Other (specify)

Other Health Specialties

11901	Dietetics
11902	Hospital administration
11903	Industrial hygiene
11904	Medical library sciences
11905	Medical technology
11906	Medical records
11907	Medical arts
11908	Pharmacy
11910	Physical therapy
11911	Occupational therapy
11909	Other (specify)

ANTHROPOLOGY

Ethology and Social Anthropology

12001	Acculturation
12002	Assimilation
12003	Cultural history
12004	Cultural and social change
12005	Cultural evolution
12006	Cross culture and comparative studies
12007	Enculturation
12008	Ethnography and area studies (specify area, using geographic area specialties list 29000)
12010	Human ecology
12009	Other (specify)

Social Organization

12101	Family and kinship systems
12102	Social stratification
12103	Political systems
12104	Religious systems
12105	Economic systems
12106	Social structure
12109	Other (specify)

Culture and Personality

12201	Attitudes and values
12202	Deviant behavior
12203	Group and national character
12204	Socialization
12209	Other (specify)

Physical Anthropology

12301	Anthropometry
12302	Human growth and constitution
12303	Human evolution
12304	Genetic distribution and population
12305	Racial variability
12306	Primatology
12309	Other (specify)

Applied Anthropology

12401	Applied physical anthropology and human engineering
12402	Business and public administration
12403	Educational institutions
12404	Food habits and diet
12405	Industrial relations
12406	Medical institutions
12407	Minority, ethnic and social problems
12408	Social medicine (public health)
12410	Social psychiatry (mental health)
12411	Technological change and social development
12409	Other (specify)

12909	Anthropology, other (specify)

Language and Literature

See list 30000

Linguistics

See list 6000

Archeology

See list 13000

ARCHEOLOGY

Early Pre-History

13001	Paleolithic and Mesolithic - Old World
13002	Paleo-Indian - New World
13009	Other (specify)

Later Pre-History

13101	Neolithic - Old World (specify areas from geographic area specialties list 29000)

Historical Period

13201	Egyptology
13202	Assyriology
13203	Classical archeology
13204	Medieval archeology
13205	Historic sites archeology - North America
13206	Colonial archeology - Latin America
13209	Other (specify)

13909	Archeology, other (specify)

ARCHITECTURE

8002	Architectural acoustics
14001	Architectural design
X903	Architectural engineering
14002	Architectural history
14003	Architectural research
14004	Architectural theory
14005	Building costs
14006	Building materials and construction methods
14007	City and regional planning
14008	Electrical equipment of buildings
14010	History of architecture
14011	Illumination
14012	Landscape architecture
14013	Mechanical equipment of buildings
14014	Model making and project presentation
14015	Professional ethics and practice
14016	Project programming
14017	Site work
14018	Structural design
14019	Visual arts
14009	Architecture, other (specify)

ART

Art History

15001	Ancient
15002	Medieval
15003	Renaissance
15004	Baroque
15005	18th Century
15006	19th Century
15007	Modern
15009	Other (specify)

151-- Studio Art) Use
) with
152-- Art Education) following

---01	Ceramic art
---02	Graphic design
---03	Industrial design
---04	Interior design
---05	Metalwork
---06	Painting
---07	Printmaking
---08	Sculpture
---10	Textile designing and weaving
---09	Other (specify)

15909 Art, other (specify)

Geographic or National Areas

See list 29000

COMMERCE AND FINANCE

Financial Theory

16001	Financial decisions theory
16002	History of finance
16003	Interest rate theory
16004	International finance

16005	Price theory
16009	Other (specify)

Business Finance

16101	Capital budgeting, costs, and structure
16102	Corporation finance
16103	International business management
16104	Mergers, consolidations and liquidations
16105	Small business finance
16106	Taxation and business management
16107	Corporate taxation and financial policy
16108	Credit management
16110	Asset management
16111	Return on investment concepts and profitability analysis
16109	Other (specify)

Banking

16201	Bank capital and reserves
16202	Central banking: monetary policy and management
16203	Commercial bank operations and management
16209	Other (specify)

Financial Institutions

16301	Credit unions
16302	Finance companies
16303	Government financing agencies
16304	Insurance companies
16305	Investment bank and funds
16306	Pension funds
16307	Real estate financing organizations
16308	Savings and loan associations
16309	Other (specify)

Public Finance

16401	Public debt and debt management
16402	Taxation and revenue
16409	Other (specify)

Investment and Securities

16501	Currency and monetary standards
16502	Investment banking
16503	Money and credit instruments
16504	Money and credit markets
16505	Portfolio management
16506	Securities regulation
16507	Securities market behavior
16508	Securities analysis
16510	Securities brokerage operations
16511	Investment companies and institutional investing
16512	Capital markets
16513	Commodity markets and brokerage
16509	Other (specify)

Risk and Insurance

16601	Actuarial science
16602	Business insurance and estate analysis
16603	Employee benefit plans
16604	Health insurance
16605	Insurance law
16606	Insurance regulation
16607	Life insurance
16608	Property - casualty insurance
16610	Pure risk theory
16611	Risk management
16612	Social insurance
16609	Other (specify)

Real Estate Finance

16701	Government mortgaging financing agencies
16702	Mortgage lenders and institutions
16703	Mortgage markets
16704	Residential mortgage financing
16709	Other (specify)

Labor and Industrial Relations

16801	Adjustment and settlement of labor disputes
16802	Comparative labor-management studies
16803	History of labor movement
16804	Labor and public policy

16805	Labor law and legislation
16806	Labor-management communications
16807	Labor-management relations
16808	Labor-management conflict and experimental forecasting
16810	Labor-management contracts, bargaining, and administration
16811	Labor union administration
16812	Management decision theory
16813	Management information systems
16814	Management science and the operation of the firm
16815	Mathematical models for industry
16816	Micro-economics of labor-management
16817	Personnel bureau pathologies
16818	Personnel and human relations
16819	Personnel management, administration and organization
16820	Wage and salary administration
9609	Industrial psychology
B605	Industrial sociology
9607	Personnel recruitment, training and placement
16809	Other (specify)

Marketing

16X01	Brands, trademarks, labels
16X02	Channel analysis in marketing
16X03	Comparative marketing systems
16X04	Computer applications to marketing
16X05	Consumer behavior
16X06	Cooperative marketing
16X07	Customer service and service policies
16X08	Distribution cost analysis
16X10	Ethics of marketing and advertising
16X11	History of marketing and marketing theory
16X12	Location and spatial relations in marketing
16X13	Marketing and economic development
16X14	Marketing intelligence
16X15	Marketing and public policy
16X16	Marketing institutions-retailing and wholesaling
16X17	Marketing management and decision theory
9605	Marketing research
16X18	Mass media communication in marketing
16X19	Mathematical models in marketing
16X20	Packaging
16X21	Physical distribution systems in marketing
16X22	Pricing structures and policies in marketing
16X23	Product development in marketing (including product testing)
16X24	Promotional effort - selling, advertising and public relations
16X09	Other (specify)

International Commerce

16B01	Arbitration in international commerce
16B02	Channel analysis for international trade
16B03	Commercial policies, treaties, and agreements affecting international trade
16B04	Cooperative international marketing
16B05	Credit analysis, guarantees and insurance in international commerce
16B06	Distribution cost analysis in international trade
16B07	Financing and financial institutions in international marketing
16B08	Foreign exchange and investments: international markets
16B10	Geographical area studies affecting international markets
16B11	International commodity markets
16B12	International marketing management and decision theory
16B13	International marketing research
16B14	International marketing theory
16B15	International organizations and institutions of marketing
16B16	Legal principles and obstacles affecting international markets
16B17	Licensing of international commerce
16B18	Location and spatial relations affecting international marketing
16B19	Manufacturing abroad
16B20	Mores of different peoples affecting international trade
16B21	Physical distribution systems for international trade

16B22	Pricing structures and policies in international commerce
16B23	Product development for foreign markets
16B24	Promotional effort-selling, advertising and public relations (government and private)
16B09	Other (specify)

16909	Commerce and Finance, other (specify)

Economics

See list 5000

Law

See list 20000

EDUCATION

Levels of Education As Specialties

17001	Nursery-kindergarden education
17002	Elementary education
17003	Secondary education
17004	Junior college education
17005	Higher education
17006	Extension education
17009	Other (specify)

School Practice

17101	Audio-visual communication
17102	Curriculum principles, planning and construction
17103	Tests and examinations
17104	Testbooks
17105	Training devices
17106	Supervision of student teachers
17107	Counseling
17108	Educational supervision
9302	Programmed learning
17109	Other (specify)

Particularized Education

17201	Adult education
17202	Aged and aging, education for
17203	Rehabilitation
17204	Rural education
9305	Special education
17205	Teacher education
17206	Technical education
17207	Vocational education
17208	Women, education of
17209	Other (specify)

Educational Psychology

9301	Educational measurement
9303	School adjustment
9304	School learning
9309	Other (specify)

Education in General

17301	Comparative education
17302	Foundations of education
17303	History of education
17304	Parent-teacher relationships
17305	Philosophy of education
17306	Research methods
17307	Theories of education
17308	Teaching-learning process
17309	Other (specify)

Administration

17401	Accreditation of schools and colleges
17402	College administration
17403	Financial aspects
17404	Individual schools
17405	Institutional research
17406	Legal aspects
17407	Organizational patterns
17408	Plant and equipment
17410	Public relations
17411	Salary schedules
17412	School districts
17413	School libraries
17414	School systems
17415	Teaching load

9306	Student personnel
9307	Teacher personnel
17416	Volunteer services
17409	Other (specify)

17909	Education, other (specify)

HISTORY

Historic Period

18001	Ancient history (pre A.D. 500)
18002	A.D. 500 - 1100
18003	A.D. 1100 - 1500
18004	16th Century
18005	17th Century
18006	18th Century
18007	19th Century
18008	20th Century
18009	Other (specify)

Geographic or National Region

See list 29000

Topical Specialty

18101	Agricultural history
18102	Business history
18103	Constitutional and legal history
18104	Cultural, social and intellectual history
18105	Diplomatic history
18106	Economic history
18107	Institutional history
18108	Military history
18110	Political history
18111	Religious history
18112	State and local history
18113	Urban history
18114	Biography
18115	Historiography
18116	Methodology
18109	Other (specify)

18909	History, other (specify)

HOME ECONOMICS

Metabolism

19001	Carbohydrate
19002	Energy
19003	Lipid
19004	Mineral
19005	Protein
19006	Vitamin
19009	Other (specify)

Design

19101	Applied
19102	Costume
19103	Craft
19104	Interior
19109	Other (specify)

Textile Testing

19201	Chemical textile testing
19202	Physical textile testing
19203	Textile analysis
19209	Other (specify)

Clothing

19301	Aesthetics
19302	Construction
19303	Economics and sociology
19309	Other (specify)

Pattern

19401	Drafting
19402	Draping
19403	Grading
19409	Other (specify)

Foods

19501	Biological value of foods
19502	Experimental foods
19503	Food technology
19509	Other (specify)

Education

19601	Family life
19602	Home economics
19609	Other (specify)

Management

19701	Home
19702	Institution
19709	Other (specify)

Others

19901	Child development
19902	Diet therapy
19903	Family economics
19904	Historic costume
19905	Historic interiors
19906	Household equipment
19907	Housing
19908	Human relations
19910	Public health nutrition
19909	Other (specify)

LAW

Business Associations

20001	Agency
20002	Corporate finance
20003	Corporate reorganization
20004	Corporations
20005	Partnership
20006	Securities regulation
20009	Other (specify)

Business Regulation

20101	Antitrust
20102	Patents, trademarks, copyrights
20103	Public utilities
20104	Trade regulation
20105	Unfair competition
20109	Other (specify)

Commercial Law

20201	Banking
20202	Bills and notes
20203	Sales
20204	Security
20209	Other (specify)

Creditors' Transactions

20301	Bankruptcy
20302	Credit transactions
20303	Creditor's rights
20304	Suretyship
20305	International transactions
20309	Other (specify)

Estates and Administration

20401	Estate planning
20402	Estate and gift tax
20403	Fiduciary administration
20404	Income tax
20405	Trusts
20406	Wills
20409	Other (specify)

Legal Research and Writing

20501	Legal bibliography
20502	Legal draftsmanship
20503	Legal writing
20509	Other (specify)

Other Legal Systems

20601	Canon law	
20602	Civil law	) Specify by
20603	Comparative law	) region,
20604	Public international law	) using list) 29000
20605	Roman law	
20609	Other (specify)	

Practice and Procedure

20701	Appellate practice
20702	Civil practice
20703	Evidence
20704	Federal jurisdiction
20705	Judicial administration
20706	Legal aid
20707	Legal method
20708	Pleading

20710	Trial practice
20709	Other (specify)

Property

20801	Community property
20802	Future interests
20803	Landlord and tenant
20804	Land use planning
20805	Mining and water rights
20806	Mortgages
20807	Oil and gas
20808	Personal property
20810	Rights in land
20811	Titles and conveyances
20809	Other (specify)

Remedies

20901	Damages
20902	Equity
20903	Restitution
20909	Other (specify)

Public Law

20X01	Administrative law and procedure
20X02	Constitutional law
20X03	Criminal law and procedure
20X04	International law
20X05	Labor law
20X06	Legislation
20X07	Local government law
20X09	Other (specify)

Other Legal Specialties

20B01	Admiralty
20B02	Arbitration law
20B03	Air and space law
20B04	Conflict of laws
20B05	Contracts
20B06	Family law
20B07	Government contracts
20B08	Insurance
20B10	Jurisprudence - legal philosophy
20B11	Law and the behavioral sciences
20B12	Law and medicine
20B13	Legal accounting
20B14	Legal ethics
20B15	Legal history
20B16	Legal process
20B17	Legal profession
20B18	Military law
20B19	Office practice
20B20	Social legislation
20B21	State and local taxation
20B22	Torts
20B09	Other (specify)

LAW ENFORCEMENT

Operations

21001	Crime prevention and control
21002	Investigation
21003	Patrol
21004	Traffic
21005	Vice control
21009	Other (specify)

Staff Functions and Administration

21101	Auxiliary police
21102	Budget and fiscal
21103	Corrections
21104	Civil defense
21105	Community relations
21106	Executive direction
21107	Inspection
21108	Intelligence
21110	Personnel
21111	Public relations
21112	Research and planning
21109	Other (specify)

Technical Services

21201	Communications
21202	Industrial security
21203	Jail administration
21204	Maintenance
21205	Policy science (crime laboratory)
21206	Property management
21207	Records
21209	Other (specify)

21909	Law Enforcement, other (specify)

LITERATURE

Periods

22001	Before 500 B.C.
22002	500 B.C. - A.D. 1
22003	A.D. 1 - 500
22004	500 - 1100
22005	1100 - 1500
22006	16th Century
22007	17th Century
22008	18th Century
22010	19th Century
22011	20th Century
22009	Other (specify)

Types Within Periods

22101	Ballad
22102	Biography (as literary type)
22103	Criticism
22104	Drama
22105	Essay
22106	Folklore
22107	Historiography
22108	Literature and cultural history
22110	Novel
22111	Oratory
22112	Poetry
22113	Short story
22109	Other (specify)

Literary Theory and Criticism (Within Designable Periods)

22201	Aesthetics
22202	History of criticism
22203	Literary theory
22204	Prosody
22205	"Pure" theory independent of periods given above
22206	Rhetoric
22209	Other (specify)

Forms of Study

22301	Analytic (or descriptive) bibliography
22302	Biographical research
22303	Editing
22304	Epigraphy
22305	Explication, interpretation
22306	History of ideas
22307	Paleography, diplomatics
22308	Papyrology
22310	Textual criticism
22309	Other (specify)

Creative Writing

22401	Creative writing

By language or groups,
see list 30000

22909	Literature, other (specify)

MUSIC

Musicology

23001	Early - before 1600
23002	Common practic period - 1600 - 1900
23003	20th Century
23004	Ethnomusicology
23009	Other (specify)

Performance

23101	Band
23102	Chorus
23103	Chamber music, brass
23104	Chamber music, string
23105	Chamber music, wind
23106	Ensemble of ancient instruments
23107	Opera
23108	Orchestra
23110	Solo
23109	Other (specify)

Instrument

23201	Violin
23202	Viola
23203	Cello
23204	Double bass
23205	Flute
23206	Oboe
23207	Clarinet
23208	Bassoon
23210	Trumpet
23211	French horn
23212	Trombone
23213	Tuba
23214	Percussion
23215	Piano
23216	Harp

23217	Organ
23218	Voice
23209	Other (specify)

Other

23901	Composition
23902	Theory
23903	Electronic music techniques
23909	Other (specify)

By Region

See list 29000

PHILOSOPHY

History and Criticism of Philosophic Systems by Historic Periods

24101	Greek and Hellenistic
24102	Patristic and medieval
24103	Modern
24104	Post-Kantian
24105	Contemporary
24109	Other (specify)

History and Criticism of Philosophic Systems by Geographic Regions

24201	Specify, using Geographic or National Areas, list 29000

Branches of Philosophy

24301	Aesthetics
24302	Cosmology
24303	Epistemology
24304	Ethics
24305	Metaphysics
24306	Natural theology
24307	Philosophy of economics
24308	Philosophy of education
24310	Philosophy of history
24311	Philosophy of language
24312	Philosophy of law
24313	Philosophy of man (human nature)
24314	Philosophy of mathematics
24315	Philosophy of moral sciences
24316	Philosophy of nature
24317	Philosophy of physical sciences
24318	Philosophy of psychological sciences
24309	Other (specify)

Social and Political Philosophy of Specific Peoples

24401	Specify geographic area, using list 29000

Logic

See list 7300

POLITICAL SCIENCE

Theory and Methodology

25001	American political thought
25002	Fundamentals of government
25003	History of political thought
25004	Modern political thought
25005	Methodology
25006	Political theory
25007	Public policy
25008	Theory and process of political development
25009	Other (specify)

American Government and Politics

25101	American diplomacy
25102	Constitutional law and civil liberties
25103	Economic and social functions
25104	Government documents
25105	Group politics
25106	Intergovernmental relations
25107	Judicial administration
25108	Local government
25110	Metropolitan government and politics
25111	National government
25112	Political behavior
25113	Political interest groups
25114	Political parties and elections
25115	Pressure groups, propaganda, and public relations
25116	Public opinion
25117	State government
25109	Other (specify)

Foreign and Comparative Government

25201	Comparative political institutions
25202	Regionalism
25203	Undeveloped countries
25209	Other (specify) (For above, specify region, using Geographic or National Areas, list 29000)

International Relations

25301	Comparative and American foreign policy
25302	Contemporary problems
25303	International politics
25304	International law and organization
25305	National foreign policies and issues
25306	Regional foreign policies
25309	Other (specify)

Public Administration

25401	Administrative behavior
25402	Administrative decision making
25403	Administrative law
25404	Administrative responsibilities and control
25405	Administrative techniques
25406	Bureaucratic systems
25407	City management
25408	Comparative public administration
25410	Concepts, theory and method
25411	Organization and administrative relationships
25412	Personnel and fiscal management
25413	Urban development
25409	Other (specify)

25909 Political Science, other (specify)

Law

See list 20000

Geographic and National Areas

See list 29000

SOCIAL WORK AND WELFARE

26001	Community
26002	Corrections
26003	Family and/or child welfare
26004	Medical, including public health
26005	Psychiatric
26006	Public assistance
26007	Public education
26008	Social case work
26010	Social case work supervision
26011	Social group work
26012	Social policy formulation
26013	Social work administration
26014	Social work education
26015	Social work research

26009 Social Work and Welfare, other (specify)

SPEECH

Rhetoric and Public Address

27001	Greek and Roman rhetoric
27002	History of American public address
27003	History of British public address
27004	Medieval and Renaissance rhetoric
27005	Modern and contemporary rhetoric
27006	Principles of rhetorical criticism
27007	Principles and types of public address
27008	Rhetorical criticism of great orators
27009	Other (specify)

Discussion and Debate

27101	Basic principles of argument
27102	Committee and conference methods
27103	Forms of debate
27104	Forms of public discussion
27105	Parliamentary procedure
27109	Other (specify)

Oral Interpretation of Literature

27201	Choral speaking
27202	Reading aloud
27203	Storytelling
27209	Other (specify)

Radio and Television

27301	Directing and acting
27302	Management
27303	News and announcing
27304	Principles and procedures
27305	Production
27306	Programming
27307	Sales and advertising
27308	Television drama
27309	Other (specify)

Speech Pathology and Audiology

27401	Aural rehabilitation
27402	Diagnostic audiology
27403	Functional disorders of speech
27404	Organic disorders of speech
27405	Psychological disorders of speech
27406	Psycho-acoustics
27407	Speech correction
27408	Stuttering
27410	Speech of the mentally retarded and the emotionally disturbed

Theatre and Drama

27501	Acting
27502	Creative dramatics
27503	Children's theatre
27504	Directing
27505	Dramatic literature
27506	Puppetry
27507	Stage costume and make-up
27508	Stagecraft
27510	Theatre architecture
27511	Theatre history (world)
27512	Theatre history (American)
27513	Theatre organization and management
27509	Other (specify)

27909 Speech, other (specify)

Literature

See list 22000

Language and Linguistics Groups

See list 30000

Linguistics

See list 6000

LIBRARY SCIENCE

History of Library Science

28001	History of books and printing
28002	History of libraries
28003	Paleography
28009	Other (specify)

Service Specialties

28101	Abstracting
28102	Advisory service
28103	Bibliography
28104	Cataloging, descriptive
28105	Cataloging, revisions
28106	Cataloging, serials
28107	Classification
28108	Documentation
28110	Exhibitions and publicity
28111	Information storage and retrieval
28112	Library administration
28113	Selection and evaluation of collections
28109	Other, service (specify)

28909 Library Science, other (specify)

Subject Specialties

Specify, using lists 0000 - 30000

GEOGRAPHIC OR NATIONAL AREAS

29B00 Africa

29X00 Antarctica

Eastern Europe

29001	Albania
29002	Bulgaria
29003	Czechoslovakia
29004	Hungary
29005	Poland
29006	Rumania
29007	U.S.S.R.
29008	Yugoslavia
29009	Other (specify)

Far East

29101	China
29102	Japan
29109	Other (specify)

Latin America

29201	Argentina
29202	Bolivia
29203	Brazil
29204	British Guiana
29205	Central America
29206	Chile
29207	Colombia
29208	Ecuador
29210	French Guiana
29211	Mexico
29212	Paraguay
29213	Peru
29214	Surinam
29215	Uruguay
29216	Venezuela
29217	West Indies
29209	Other (specify)

29300 Middle East and Arab North Africa

North America

29401	Alaska
29402	Arctic
29403	Atlantic states
29404	Canada
29405	Far West
29406	Great Lakes
29407	Midwest
29408	New England
29410	Pacific Northwest
29411	Plains
29412	South
29413	Southeast
29414	Southwest
29415	U.S.A. (as a whole)
29409	Other (specify)

29500 North and Central Asia

Oceania

29601	Australia
29602	Indonesia
29603	Melanesia
29604	Micronesia
29605	New Zealand
29606	Polynesia
29609	Other (specify)

South and Southeast Asia

29701	India
29702	Pakistan
29703	Ceylon
29704	Burma
29705	Thailand
29706	Cambodia
29707	Viet-Nam
29708	Philippines
29709	Other (specify)

Western Europe

29801	Austria
29802	Belgium
29803	Denmark
29804	Finland
29805	France
29806	Germany

29807	Greece
29808	Great Britian
29810	Ireland
29811	Italy
29812	Luxembourg
29813	Netherlands
29814	Norway
29815	Portugal
29816	Spain
29817	Sweden
29818	Switzerland
29809	Other (specify)
29909	Geographic or National Areas, other (specify)

LANGUAGE AND LITERATURE SPECIALTIES

30B00	African
30000	Eastern European
30100	Far Eastern
30200	Latin American
30300	Near and Middle Eastern
	North American
30401	Anglo
30402	Hispanic
30409	Other (specify)
30500	North and Central Asian
30600	Oceanic
30700	South and Southeast Asian
	Western European
30805	French
30806	German
30808	English
30811	Italian
30816	Spanish
	Others (Including Ancient Languages)
30901	Ancient Greek
30902	Celtic
30903	Germanic, other
30904	Indo-European, other
30905	Latin
30906	Romance, other
30907	Scandinavian
30908	Semitic
30910	Slavic, other
30911	Uralic-Altaic
30909	Other (specify)

IV. Guidelines for Constructing an Activities Index As a Method of Computing Full-Time Equivalents of Part-Time Personnel

To supplement related and basic material in Chapter 4, the activities index and its component indices, the meanings of the symbols, and explanatory notes are given here as guidelines for those who wish to experiment with this method of computing FTE.

The Indices

For Teaching, including educational administration and Intra-University Activities

$$K = c + \sum_{i=1}^{k} w_i c_i + w_n \cdot n; \quad I_T = \frac{KT}{t}$$

For Teaching-Research, Teaching Through Creative Activity, and thesis direction

$$I_{T-R} = w_N \cdot N$$

For Research and Creative Activity, including their administration

$$I_R = L + P + C + A$$

For Public Service

$$I_S = S$$

The individual's activities index is

$$I = I_T + I_R + I_{T-R} + I_S$$

Meanings of the Symbols

c = number of contact hours per week in class, laboratory, or design plus formal consultation periods

c_i = number of contact hours per week in class, excluding laboratory or design for which separate preparation is needed

w_i = weight factor to represent preparation for different level classes, obtained from institutional data

k = number of different subjects requiring preparation

n = total number of students in class, laboratory or design

w_n = weight factor obtained by averaging the w_i for different level classes or proportional thereto

N = total number of students in Teaching-Research or being taught through Creative Activity in Art and Scholarship, and whose theses are being directed

w_N = weight factor for each student included in N; it may be obtained by averaging the w_i above, by sampling the faculty, or from institutional data, being proportional thereto

L = number of hours per week spent in laboratory, library, or studio on Research or Creative Activity in Art and Scholarship

P = number of hours per week spent in writing papers, proposals, or reports

C = number of hours per week spent in consultation with sponsors or authorities in the area of Research or of Creative Activity in Art and Scholarship

A = number of hours per week spent in administration of Research or of Creative Activity in Art and Scholarship

S = number of hours per week spent in Public Service

T = total percent of time (or effort) spent on Teaching, Administration (excluding Research) and Intra-University Activities

t = percent of time (or effort) spent on Teaching

I_T = index for Teaching

I_{T-R} = index for Teaching-Research and Teaching through Creative Activity in Art and Scholarship

I_R = index for Research and Creative Activity in Art and Scholarship

I_S = index for Public Service

I = faculty member's activities index

Remarks Concerning the Index Formulas

1. The maximum values of I_R and I_S will be the number of hours per week that a full-time faculty member, engaged completely in one of the areas, works in the area. For this, the institution would need to establish some standard or norm.

2. The quantities c, c_i, k, n, and N are easily measurable; the quantities L, P, C, A, and S are frequently not stated on an activities report. If these details are desired, the activities report must be designed to obtain them.

3. The Index I_R is computed from activities which, although involv-

ing Teaching, are a part of Research and Creative Activity in Art and Scholarship. Strictly, then, the time allocated to L, P, C, and A should reflect this.

4. The number of indices can be reduced by combining the $w_N \cdot N$ in with the I_R, and the I_R can be further simplified by using only the time spent on Research and Creative Activity in Art and Scholarship, without breaking it into the L, P, C, A, and $w_N \cdot N$. Then $I = I_T + I_R + I_S$.

5. Once the full-time values of I_R and I_S are established, although I_{T-R} may increase slightly the index of some research personnel, it appears that I_T should have the weights adjusted, keeping them proportional to the original weights, so that I_T equals the full-time values of I_R and I_S, approximately, for a faculty member whose activities are entirely in Teaching.

6. For faculty members lecturing to several hundred students, the index becomes distorted due to the term $w_n \cdot n$. Such faculty members will need to be treated as special cases. For example, to reduce distortion caused by large enrollments, $(W_n \cdot \sqrt{n})$ could be used in place of $w_n \cdot n$.

Using the Activities Index to Compute FTE

A norm, against which to compare the activities index of each part-time person, can be obtained by computing the activities index of a sample of full-time faculty and the mean or median of all the incides can be used as a norm. In choosing the sample, full-time faculty members engaged in Teaching (including educational administration and Intra-University Activities) only, those engaged in both Teaching and Research, and those engaged in Teaching, Research, and administration (e.g., department chairmen) should be used.

The activities index for each part-time faculty member can then be computed and the FTE of the individual can be determined from

$$\text{FTE} = \frac{\text{I}}{\text{Norm}} \quad \left(\text{or } \frac{\text{I}}{\text{Norm}} \times 100, \text{ if percent is desired}\right).$$

CHAPTER 11

FACILITIES DATA: BUILDING SPACE

I. General

Materials in this chapter supplement mainly the section in Chapter 6 on "Accomplishing the Building Space Inventory." These materials include a discussion of the personnel required, suggestions on how to obtain and record information, plus three inventory forms and instructions for coding them.

All procedures described are designed to be usable by a large or a small institution, working with its own personnel, with or without the benefit of data processing equipment. These procedures were extensively tested at two major institutions within the Project Group and found to be entirely workable. They are intended to assist institutions in establishing and taking an initial inventory.

Also included in this chapter are a list of data required for space utilization studies and suggested procedures for obtaining derived measures of space utilization - materials which supplement the section in Chapter 6 on "Types of Space Utilization Studies."

II. Supplementary Materials on Accomplishing the Building Space Inventory (Exclusive of Inventory Forms)

Personnel Required

The specific task of inventory personnel is the assembly of information concerning the identification, history, quantity, quality, fiscal value, and assignment of certain space on the campus.

Before an inventory is begun, the responsibility for coordinating the project should be assigned to an administrative officer. It should

---

NOTE:
For acknowledgment of source documents used in the preparation of this chapter, see footnote at beginning of Chapter 6.

be his responsibility to organize and to coordinate the efforts of the surveyors (i.e., anyone involved in performing the inventory). Several persons will be needed, to serve as data collectors and draftsmen (for preparing floor plans, if needed). A corroborator and a recorder will also be required.

1. Data Collectors. For the beginning job of assembling data, it is desirable to have at least two persons with some knowledge of buildings in general, and if possible of educational buildings. These persons will be expected to visit, observe, measure, and record statistical and qualitative data room by room and may also be required to read architectural drawings.

2. Draftsmen. If the data collectors are qualified, they may prepare floor plans or other drawings, as needed. Otherwise, a draftsman should be employed. A large pool of qualified personnel is available at the institution which has a department of architecture, building construction, or an allied discipline.

3. Corroborator. At some stage of the inventory, many hours of careful confirmation, verification, completion, or expansion of data will be required to insure accuracy and consistency; such effort will include making simple calculations. In addition, the consistent inventory will require a certain amount of cooperation with department heads and faculty members in order to verify and complete such items of information as the functional uses of rooms and the prorating of space among various departments.

4. Recorder. If tabulation of the data is to be completed through a hand process, a recorder of information is needed. A person with clerical experience will be capable of recording the data that has been compiled. Also, if the inventory is to be set up on a perpetual basis, a

recorder may be needed for the purpose of keeping the tabulation of data current.

If the services of a data processing department are available, the procedure for machine recording can be established after consultation with the department.

Obtaining and Recording Information

(Before reading further, the prospective surveyor should scan the three types of forms that follow in the next section, in order to gain a better perspective of the specific items of information to be collected.)

1. Existing Data. Much of the data required to establish the initial inventory can be obtained from existing files of the institution. Items such as building location; its name, number, and year of construction; source of construction funds; and similar data fall into this category. The coordinator of the surveyors should have these data assembled and recorded in his own office.

2. Existing Drawings. Many institutions have architectural drawings from which much information about the buildings may be obtained, especially if the drawings are kept up-to-date by revisions. However, many buildings do not exist in the form shown on original or revised drawings, and availability of the drawings would not eliminate the need for visiting each space. Nevertheless, a major portion of a building may exist as shown on the drawing and verification of the plan of a building from a drawing is much easier than having to measure and reconstruct the plan completely. Since a new partition may have been located within a space bearing a certain relationship to an originally constructed column or door opening or to some other element shown on

the drawing, corrections of plans should be made as a result of the on-site inspection. After the locations of walls and partitions are checked, areas and volumes may be obtained by scaling the plans.

3. On-site Inspection. On some campuses there is a paucity of building plans. In such instances, rooms and buildings should be inspected and measured for all information.

Measurements may be obtained quickly and accurately by three persons working together: two measure as the third observes, makes calculations, and records. If more than one such group is employed, the groups should begin their work by observing several spaces together in order to determine a uniform procedure and thereby insure consistency of results.

It is important that items of information based on judgment (e.g., optimum number of stations for a room) be determined in an appropriate manner. If qualified, the data collectors may be given responsibility for making such decisions. However, if they are not qualified, the person acting as corroborator may be given the responsibility. The person who is responsible for making the decisions should make them, if possible, after discussion with faculty members who use the room.

4. New Drawings. One result of the process of measuring rooms and buildings makes possible the construction, by a draftsman, of diagrammatic floor plans of any building for which no plans exist.

The original drawings should be made on high quality tracing paper or tracing cloth, in pencil, and should be retained for future revision and reprinting when alterations to a building are made. Kept up-to-date, these plans are of considerable value, when used to complement statistical information.

III. Forms and Instructions for the Inventory of Building Space

As a guide to institutions wishing to set up a building space inventory system, this section provides forms to be used as pilot sheets, together with instructions for coding them. These forms are (1) Non-Residential Room Analysis (Form A), (2) Residential Building Inventory (Form B), and (3) Non-Residential Building Inventory (Form C). Immediately after the first page of instructions for each form, a copy of the respective form will be found.

Form A is a general use form designed for recording data about nonresidential rooms. Form B provides for tabulation of residential space data by buildings rather than individual room. Form C is a summary form for recording the data collected on Form A. A system of coding is used for brevity and designed so that either hand-written or machine records may be accumulated. It is suggested that the code be used even if hand-written entries are made. This will expedite and simplify reporting of data to inquiring agencies which may desire to transfer data directly to punch cards. Coding also anticipates future conversion to a machine process by the institution.

The coding system is intended to aid in collecting a minimum of data; however, an institution may expand the collection of data within the code provided. When an item is to be answered "yes" or "no" and a one-digit code is provided, "0" denotes "no" or "none," "1" denotes "yes," or an institution may develop a code using numbers "1" through "9" as a device for collecting additional data or characteristics. In Item 14 (Form A), the coding for a room with no air conditioning will be "0," or if it has air conditioning of any type, the code will be "1." Some institutions may wish to further indicate the type of air conditioning equipment and can develop a code to indicate nine different types of equipment. The result is that in a machine compilation, codes "1" through "9" can be totaled as "yes" or can be listed separately by types. In addition to the expansion of data in the above manner, the system is designed to permit the collection of additional data through the use of supplementary punch cards.

The forms are designed to allow an institution to adapt them to its own circumstances. For example, the proposed method for classifying rooms according to their functional use may be expanded to include even room types unknown on campuses today.

Instructions for Coding Form A

Form A may be used for the inventory of nonresidential rooms, regardless of the type of permanent records to be kept. One form should be completed for each room visited.

Item 1 (Cols. 1-4)	Institutional Identification: If a national organization should request data, or possibly a deck of punch cards, a numerical code would be furnished for each participating institution. Otherwise, the institution need not complete this item.
Item 2 (Cols. 5-6)	Building Location: This space is for the use of institutions with more than one campus, or for institutions desiring to divide the campus into areas. The code should be developed by the institution.
Item 3 (Cols. 7-16)	Building Name: This must be abbreviated if more than ten letters are required. Leave one empty space between words if possible. Work from left to right beginning with Column 7. If the name or abbreviation does not use all spaces, it is unnecessary to add zeros in the remaining columns.

Chart 11-1. Form Used for Inventory of Nonresidential Rooms

FORM A. NONRESIDENTIAL ROOM ANALYSIS

Date ____________

1. Institution: ______________________________ (Name) 1 — — 4
2. Building Location: 5 6
3. Building Name: 7 — — — — — — — — 16
4. Building Number: 17 — — 20
5. Inventory Year: 21 22
6. Floor Level: 23 24
7. Room Number: 25 — — — — 30
8. Assignable Space: 31
9. Net Room Area (sq. ft.): 32 — — — 36
10. Actual Number of Stations: 37 — — 40
11. Net Area Per Actual Station: 41 — 43
12. Optimum Number of Stations: 44 — — 47
13. Chalkboard (lin. ft.): 48 — 50

Page 1 of 2

Chart 11-1. Form Used for Inventory of Nonresidential Rooms, continued

14. *Air Conditioning: (0) None, (1-9) Yes ____ 51

15. *Type of Seating: (0) None, (1-9) Yes ____ 52

16. *Darken for Visual Aid: (0) No, (1-9) Yes ____ 53

17. *Closed-Circuit Television: (0) No, (1-9) Yes ____ 54

18. *Wired Sound Amplification: (0) No, (1-9) Yes ____ 55

	Space Assigned To				
19. Card No.	20. Department Name	21. Department Number	22. Function Assigned	23. Type of Room	24. Square Foot Proration
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____	____	____	____	____	____
____ 56	____ 57 61	____ 62 68	____ 69 71	____ 72 74	____ 75 79

25. Card Type: ____ 80

*Codes (1-9) may be used to expand the "yes" answer, as desired.

Page 2 of 2

Item 4
(Cols. 17-20)

Building Number: Every building should be given a permanent number. If an institution does not have a permanent numbering system, the office completing the inventory should assign each building a number for use by the agency requesting the information. This will also expedite machine sorting and analysis.

Item 5
(Cols. 21-22)

Inventory Year: Enter the last two digits of the calendar year in which the inventory is being made or, if the institution maintains an inventory on a permanent basis, the year of the latest review of the building.

Item 6
(Cols. 23-24)

Floor Level: Use the following codes:

S - Sub-basement - A story of a building below a basement.

B - Basement - A story of a building or structure having one-half or more of its clear height below grade.

G - Ground Floor - A story of a building or structure having less than one-half of its clear height below grade: i.e., the floor most nearly level with grade at the principal point of entry to the building.

1 - First Floor - The story immediately above the ground floor.

2 - Second Floor - The story above the first floor.

3 - Third Floor - etc.

Item 7
(Cols. 25-30)

Room Number: Insert here the number of the room under study. Alphabetic letters may be included along with numbers. For example, a room number might appear as follows:

$\underset{25}{\underline{M}}\ \underline{S}\ \underline{1}\ \underline{0}\ \underline{3}\ \underset{30}{\underline{A}}$

Item 8
(Col. 31)

Assignable Space: The definition of assignable space as used in the room analysis should conform to the definition as set forth in Item 10 of Instructions for Coding Form C. Code assignable space as follows:

0 - No
1 - Yes

Item 9 (Cols. 32-36)	Net Room Area (Sq. ft.): Insert the actual inside length, times width, plus or minus the area of structural "limitations" of any consequence.
Item 10 (Cols. 37-40)	Actual Number of Stations: Enter the actual number of chairs or places where people may be assigned at one time. This item should be completed for the following types of rooms: classrooms; auditoria, theaters, chapels; teaching laboratories; seminar rooms; all offices; conference rooms; band or choral rooms; reading rooms; and dining rooms. All other rooms should be coded "0" in this item.
Item 11 (Cols. 41-43)	Net Area Per Actual Station: This figure is obtained by dividing Item 9 (Net Room Area) by Item 10 (Actual Number of Stations).
Item 12 (Cols. 44-47)	Optimum Number of Stations: Insert the number of stations best calculated to obtain a desirable and efficient use of the room for the purpose for which it is now used. This may be the same, more, or less than the actual count at the time of inspection. Such judgments may be based upon standard allocations of area per station or upon appropriate recommendations of the administrative heads of the various units concerned. This item should be completed for the same types of rooms listed above in Item 10.
Item 13 (Cols. 48-50)	Chalkboard: Insert the linear feet of chalkboard. This item should be completed for the following types of rooms: classrooms, auditoria, teaching laboratories, seminar rooms, and offices.
Item 14 (Col. 51)	Air Conditioned: The term "air conditioned" is meant to include mechanical refrigeration or evaporative cooling. See instructions following Item 18.
Item 15 (Col. 52)	Type of Seating: This item should be completed for the same type of rooms listed in Item 10 above. See instructions following Item 18.
Item 16 (Col. 53)	Room Can be Darkened for Visual Aid Use: See instructions following Item 18.
Item 17 (Col. 54)	Room Equipped for Closed-Circuit Television: See instructions following Item 18.
Item 18 (Col. 55)	Room Wired for Sound Amplification: See instructions that follow.

Items 14, 15, 16, 17, and 18 should be completed according to codes shown below:

0 - No
1 - 9 - Yes

These items should be completed for the following types of rooms: classrooms; auditoria, theaters, chapels; seminar rooms; and conference rooms.

Some suggested codes for Item 14 are as follows:

1 - Exhaust Fan
2 - Window Unit
3 - Room Unit
4 - Central Air Conditioning

Some suggested codes for Item 15 are as follows:

1 - Fixed chairs without tablet arm
2 - Movable chairs without tablet arm
3 - Fixed chairs with tablet arm
4 - Movable chairs with tablet arm
5 - Table seating
6 - Stools
7 - Theater-type chairs
8 - Mixture of the above
9 - Does not apply

NOTE ON THE USE OF MULTIPLE CARDS FOR ITEMS 19-25

Items dealing with physical features of a room can be expressed uniquely. Items of information dealing with use of the room can vary because of the presence of multiple use rooms. In order to permit maximum flexibility, the multiple card concept, for items concerning use of rooms, is explained at the end of the instructions for this form.

Not all summaries of data will require the use of characteristics. Item 19 of a summary card will contain a zero (0) indicating that the remaining items are summary information. A summary card will be prepared for each room containing Items 1-18. Items 20-23 will be left blank. Item 24 will contain the same information (net room area) as Item 9. Item 25 will contain a "2." All cards with a zero (0) in Item 19 will be known as "Room Summary Cards."

In order to obtain information concerning use and assignment of space, additional cards will be prepared - one for each different use and/or type.

Cards other than the room summary card "0" will contain Items 1-18 identical to the "0" card. Item 19 will contain the digits "1" - "9" or the characters "A" - "Z" as needed to give each use and/or type for that room a unique identifier. Items 20-23 will contain the necessary indicative information. Item 24 will contain a prorated area for that particular use and/or type. The proration will be made such that the sum of Item 24 in cards other than the Room Summary Card will equal Item 24 in the Room Summary Card.

This system of multiple cards permits the user to expand the room analysis to any extent he desires and yet obtain compatible information.

Item 19
(Col. 56)

Card Number: Insert here the alphabetic designation of the card. If only one card is necessary, insert "A" since the machine will add only the "A" card when compiling totals.

Item 20
(Cols. 57-61)

Department Name: Insert the name of the department to which the room is assigned. Abbreviate, if necessary.

Item 21
(Cols. 62-68)

Department Number: A department number is required for use in machine processing. Each institution may develop its own system or use a budgetary account number or another system in use at the institution.

Item 22
(Cols. 69-71)

Function: A three-digit code is recommended for classifying rooms by function. A standard classification for the first two digits follows.[1] The third digit is reserved for institutional use.

Educational, Research and General

01 - Instruction and Departmental Research - Space used by an academic department for purposes of instruction and research conducted by a department in coordination with a class. This includes classrooms, teaching laboratories, departmental storage space, offices of faculty, assistants, and accompanying clerical personnel.

02 - Organized Research - All space devoted to research not sponsored or conducted in coordination with a class, for which funds have been

---

[1] The classification of rooms by function used in this chapter is based on categories described in *College and University Business Administration*, Vol. I (Washington, D. C.: American Council on Education, 1952), rather than the institutional activities listed on the Data Organization chart. Time did not permit the latter group of activities to be tested in connection with space classification and utilization. Such testing should be done for compatibility to exist among all data areas developed during this study.

separately budgeted and the work is accomplished by faculty or paid student personnel.

03 - Sponsored Research - Space devoted to activities performed in accordance with the conditions of contracts with governmental agencies or other outside organizations or persons to conduct specific research projects or to render other specialized services for which payment will be made on a cost or fixed-price basis, as distinguished from a gift or grant paid to the institution which may bear little or no relation to cost.

04 - General Administrative Offices - All space devoted to general administrative offices including storage space, reception rooms, and conference rooms. Excluded from this category is space used by personnel paid from sources other than appropriated funds, all space used by the physical plant, and all departmental space, as well as offices of academic deans.

05 - Organized Activities Relating to Instructional Departments - Space devoted to activities relating directly to the instructional program and their primary purpose as to provide professional training to students; the activities may or may not be self-sustaining (home economics, cafeteria, agricultural college farm, creameries, and laboratory or demonstration schools).

06 - Reserved for Institutional Use

07 - Physical Plant - All space devoted to the physical plant operations, including that space used by the utilities plant.

08 - Library - All space in the main libraries of a college and including all space devoted to departmental libraries.

09 - Other Educational, Research and General - All space devoted to educational, research and general activities which do not fit into the above categories.

Non-Educational Activities

20 - Auxiliary Enterprises and Activities - Space devoted to income-producing enterprises operated primarily for service to students and staff and intended to be financially self-supporting (dining halls, residence halls, bookstores, student union, laundries, student publications, and student hospitals).

21 - Service Departments - Space used by departments organized primarily for the purpose of performing services to educational or operating units (repair shops, print shops, photographic shops, statistical and tabulating offices, and supply centers that are separate from the bookstore). Exclude all physical plant operations from this category.

22 - Regulatory Services - Space used by such services as Feed Control, State Chemist, and Rodent and Predatory Animal Control.

23 - Not in Service - Existing - Any room not in use which is located in an existing building.

24 - Not in Service - New - Any room not in use due to incompletion of room or building.

25 - Other Non-educational and Non-research - All other non-educational and non-research facilities which do not fit into the above categories such as public service facilities.

Item 23
(Cols. 72-74)

Type Room: The following code is to be used in describing the room by type. The first digit designates the general classification of the room according to its primary use as set forth below:

1 - Offices
2 - Teaching Facilities
3 - Research Facilities
4 - Library and Museum
5 - Staff and Student Services
6 - Hospital and Infirmary
7 - Farm
8 - Other Space
9 - Reserved for Institutional Use

Each institution may develop a code for the last two digits in accordance with practices in the institution. A code which may be used as a guide in establishing a classification system follows. However, to undertake the classroom utilization studies referred to in Chapter 6, it will be necessary to use a detailed breakdown of the 200 series as suggested under Teaching Facilities.

Offices

101 - Office, Administrative (General) - Any office used for administrative personnel, excluding clerical, stenographic, or other general office space.

102 - Office, Faculty - Any room assigned for use by one or more persons of the teaching faculty, research or extension staff, but excluding administrative offices and those used by graduate assistants.

103 - Office, Graduate Assistant - Any room assigned exclusively to one or more graduate assistants to be used as an office.

104 - Office, Clerical - Any room assigned to or used primarily by clerical or non-academic staff members as an office or departmental workroom.

105 - Office, Service - File rooms, vaults, machine-records rooms, mimeograph rooms, waiting rooms, interviewing rooms, and other general office space such as storage rooms.

106 - Office, Other - All other offices which do not fit in the above categories.

107 - Conference Room - A room equipped with a table and chairs and designed to be used for conferences and excluding any room of this type which is used primarily for regularly scheduled classes.

Teaching Facilities

201 - General Classroom - Any general purpose instructional room designed primarily for lectures, recitations, discussions, or quizzes, and excluding any teaching auditoriums or seminar rooms.

202 - General Classroom Service Area - Storage space, equipment room, etc., in conjunction with a general classroom.

203 - Teaching Laboratory - Any special purpose instructional room including rooms used for science, art, drafting, library science, home economics, etc.

204 - Teaching Laboratory Service Area - Auxiliary facilities for teaching laboratories, such as supply and equipment issue rooms, balance rooms, preparation rooms.

205 - Teaching Auditorium - Any room that is so designated by the institution.

206 - Teaching Auditorium Service Area - Auxiliary facilities for auditoriums such as storage areas, equipment rooms, and projection booths.

207 - Seminar Room - Instructional rooms that contain a table or tables and chairs arranged for informal discussion-type instruction.

208 - Radio and/or TV Studio - Any room or series of rooms containing specialized equipment for instruction in radio and television, including control rooms and dressing rooms.

209 - Music Studio - A room used for the musical instruction of individual students.

210 - Music Practice Room - A room used for musical practice by small groups or individuals.

211 - Band or Choral Room - A fairly large room used for rehearsals for band, orchestra, or chorus.

Research Facilities (Note: This is a particularly difficult area, since research is a function which can take place in all types of space, including offices. A clear-cut understanding of this classification is imperative before the inventory procedure is begun.)

301 - Research Laboratory - Any special purpose room used for research whether by faculty or graduate students or for organized or sponsored research.

302 - Research Laboratory Service Area - Related service rooms for a research laboratory, including darkroom, controlled environment storage room, sterilizer rooms, supply and equipment issue rooms, etc.

303 - Greenhouse - Any greenhouse whether used for instruction, research, or exhibition. Includes headhouse or other directly related auxiliary facilities.

Library and Museum (Note: Multiple use rooms used for reading, carrels and/or stacks should be prorated according to space used for each function.)

401 - Reading Room - A reading room including microfilm or listening rooms and typing rooms with or without shelves around the wall, but excluding multiple rows of shelving extending into the room.

402 - Carrel - The area for an individual study station within or adjoining the library stacks. If an individual study desk is located in a general reading room, it should be counted in the reading room and not as a carrel.

403 - Library Stacks - Any library area containing shelving or film space for collections in addition to that against the wall.

404 - Library Service - Circulation desks, acquisitions work area, microfilm processing, bookbinding, catalog areas (if they are in special rooms), and excluding administrative offices, clerical offices, and instructional rooms.

405 - Museum Service - Any room used for storing and preparing exhibits, but not including offices and clerical areas.

406 - Exhibition Room or Gallery - Any room used for exhibits of any kind, including those for departmental collections. Permanent departmental study collections not primarily for general exhibition shall be classed as Teaching Laboratory or Research Laboratory or prorated to both.

Staff and Student Services

501 - Auditorium or Theater - A room which possesses a stage and is generally equipped for dramatic or musical productions. Include seating area, stage, and orchestra pit, if any. An auditorium regularly used as a classroom will be scheduled and included under Teaching Auditorium.

502 - Auditorium Service Area - Auxiliary rooms such as dressing rooms, projection booths, control rooms, etc.

503 - Chapel - A room used primarily for devotional activities.

504 - Dining Room - A room regularly used for dining, including restaurants, cafeterias, snack bars, banquet halls, etc.

505 - Food Service Area - Rooms used as kitchens, serving areas, dishwashing, refrigerated food storage, meat-cutting areas, general food storage, etc.

506 - Merchandising Service - Rooms used for bookstores, barber shops, concession areas, post offices, etc., including storage areas for such enterprises.

507 - Student Activities - Any room which serves extra-curricular interests of the student body, excluding rooms which fit logically into another category.

508 - Staff Activities - Any room serving the professional, social or recreational interests of staff members, excluding gymnasia.

509 - Guest Room - Any room used as overnight accommodations for assignment or rental to guests.

510 - Recreation Room - Any room normally used as a lounge, game room, or social activity room.

Hospital and Infirmary

601 - Reception Room - Any room used for receiving and waiting in a hospital or infirmary.

602 - Examination and Treatment Room - Any room used for medical examinations and the administering of treatment to patients.

603 - Hospital Bedroom - Patient rooms or wards.

604 - Operating Room - Any room used for the performance of minor or major surgery.

605 - X-Ray Room - Any room used for X-ray purposes and containing special equipment for that purpose.

606 - Nurses Quarters - Any rooms or areas in hospitals reserved for resident nurses.

607 - Pharmacy - A room in which drugs and medications are stored and/or prepared for use.

608 - Clinical Laboratory - A room in which specimens are procured, prepared, analyzed, and stored in conjunction with diagnostic and/or patient care functions.

609 - Sterile Supply Rooms and Utility Rooms - Any room in which sterile supplies and equipment are stored, handled, and/or prepared for use. Include soiled and clean utility rooms, sub-utility rooms, and linen rooms.

610 - Other Hospital Rooms - Any hospital or infirmary room not included above.

Farm

701 - 799 - Reserved for Institutional Use.

Other Space

801 - Shops - Shop areas used for manufacturing and maintenance, etc. An instructional shop - e.g., for industrial arts - should be classified under Teaching Laboratory.

802 - Storage - General storage facilities such as a general warehouse, central stores, etc. Office and departmental storage space should be classified as Office Service, etc.

803 - Gymnasium - The actual activities areas including basketball courts, wrestling rooms, indoor track, field areas and spectator seating but excluding public service areas.

804 - Gymnasium Service Area - Any room such as shower, locker, clothing equipment or training room, but excluding spectator seating and public service areas such as corridors, stairs, lobby, and toilet rooms.

805 - Swimming Pool (Natatorium) and Service Area - Any swimming pool (indoors) and its adjacent equipment or control rooms.

806 - Armory - Indoor drill areas and special purpose military science instructional rooms, excluding those classified as general classrooms.

807 - Armory Service Area - Clothing and Equipment rooms, and other auxiliary facilities for military science.

808 - Laboratory School Classrooms - Any rooms used for primary or secondary grade classroom instruction by the institution.

809 - Laboratory School Teaching Laboratories - Any rooms used for primary or secondary grade laboratory instruction by the institution.

The first digit "9" is reserved for institutional use.

Some institutions may wish to keep track of non-assignable space in addition to the assignable spaces listed previously. If so, suggested categories of non-assignable space are as follows:

1 - Temporarily Unusable Space
2 - Custodial Room
3 - Mechanical Room
4 - Rest-rooms
5 - Circulation Area
6 - Public Telephone Room

Item 24
(Cols. 75-79)

Square Feet Proration: (See information and instructions following Item 25.)

Item 25
(Col. 80)

Enter in this column the code "2." This is to indicate that the card is from the room analysis as distinguished from the building inventories.

In regard to Item 24 and the multiple card concept, many institutions may wish to prorate space among several departments that use the same space. Provision has been made to permit such a proration. Instructional space may be assigned to a central agency such as the Office of the Registrar or a central space committee. In this event, a proration of instructional space might be unnecessary. In an institution which assigns instructional space to a teaching department but which has several departments using the same space, some type of proration might be desirable. The space might be charged to each department based upon the number of classes scheduled in the space or upon the number of hours used per week. Space might be prorated on a room-by-room basis or on a composite basis.

An institution might find it helpful, particularly in the case of overhead studies, to prorate non-instructional space to the various productive functions. One method for making such a proration might be on the basis of faculty activities reports. In any event, spaces 75 through 79 in Form A are available for proration. If an institution has no requirement or desire to make such a proration, these spaces can be used for further expansion of data.

Instructions for Coding Form B

Form B is designed for use in the inventory of residential buildings. One form should be completed for each building visited.

Item 1 (Cols. 1-4)	Institutional Identification: If a national organization should request data, or possibly a deck of punch cards, a numerical code would be furnished for each participating institution. Otherwise, the institution need not complete this item.
Item 2 (Cols. 5-6)	Building Location: This space is for the use of institutions with more than one campus, or for institutions desiring to divide the campus into areas. The code should be developed by the institution and need not be submitted in any report unless requested.
Item 3 (Cols. 7-16)	Building Name: This must be abbreviated if more than ten letters are required. Leave one empty space between words if possible. Work from left to right beginning with Column 7. If the name or abbreviation does not use all spaces, it is unnecessary to add zeros in the remaining columns.
Item 4 (Cols. 17-20)	Building Number: Every building should be given a permanent number. If an institution does not have a permanent numbering system, the office completing the inventory should assign each building a number for use by the agency requesting the information. This will also expedite machine sorting and analysis.
Item 5 (Cols. 21-22)	Inventory Year: Enter the last two digits of the calendar year in which the inventory is being made or, if the institution maintains an inventory on a permanent basis, the year of the latest review of the building.
Item 6 (Cols. 23-25)	Present Use of Building: Mark the number of the category that best describes the present use of the institution's buildings from the list of descriptions that follow:

001 - Undergraduate Men's Residence Hall - Any type of multi-unit housing facility for unmarried male undergraduate students not covered by another category.

002 - Graduate Men's Residence Hall - Any type of multi-unit housing facility for unmarried male graduate students not covered by another category.

Chart 11-2. Form Used for Inventory of Residential Buildings

FORM B. RESIDENTIAL BUILDING INVENTORY

Date ____________

1. **Institution:** ______________________ (Name) 1 __ __ 4

2. **Building Location:** 5 6

3. **Building Name:** 7 __ __ __ __ __ __ __ __ 16

4. **Building Number:** 17 __ __ 20

5. **Inventory Year:** 21 22

6. **Present Building Use:** 23 __ 25

7. **Type and Amounts of Space:**

Type of Rooms	No. of Rooms	Total Net Area in Square Feet (hundreds)
a. Study-Bedrooms	26 __ __ 29	30 __ __ 33
b. Lounges-Recreation Rooms ...	34 35	36 __ 38
c. Kitchen-Dining Rooms	39 40	41 __ 43
d. Toilets-Shower Rooms	44 __ 46	47 __ 49
e. Laundry-Service-Storage	50 51	52 __ 54
f. Resident Staff Quarters	55 56	57 __ 59
g. Other Rooms	60 61	62 __ 64

8. **Gross Area of Building:** 65 __ __ 68

9. **Normal Capacity of Building:** 69 __ __ 72

10. **Reserved for Institutional Use:** 73 __ __ __ __ __ 79

11. **Card Type:** 80

---

003 - Undergraduate Women's Residence Hall - Any type of multi-unit housing facility for unmarried female undergraduate students not covered by another category.

004 - Graduate Women's Residence Hall - Any type of multi-unit housing facility for unmarried female graduate students not covered by another category.

005 - Co-educational Undergraduate Residence Hall - A multi-unit housing facility for unmarried undergraduate students of both sexes.

006 - Co-educational Graduate Residence Hall - A multi-unit housing facility for unmarried graduate students of both sexes.

007 - Married Student Apartments - Any type of dwelling quarters used for the housing of married students and their families.

008 - Single Student Apartments - Any type of housing quarters providing cooking and dining facilities in addition to sleeping accommodations for unmarried students of either or both sexes.

009 - Student and Faculty Apartments - Any type of housing quarters providing cooking and dining facilities in addition to sleeping accommodations for both students and faculty.

010 - Faculty Apartments - Any multi-unit housing facility owned or controlled by the institution that is rented or provided for faculty occupancy.

011 - Faculty or Staff House - Any single unit housing facility owned or controlled by the instituion that is rented or provided for faculty or staff occupancy.

012 - Hotel-type Transient Operation - Any type of accommodation that is designed to provide housing for short-stay guests of the institution or that is otherwise operated as a hotel by the institution.

013 - Fraternity House - Any institution-owned or institution-controlled housing facility that is used to house male students as a social group.

014 - Sorority House - Any institution-owned or institution-controlled housing facility that is used to house female students as a social group.

015 - Cooperative House for Men - Any institution-owned or institution-controlled housing facility in which male student residents provide a major portion of the housekeeping and food service labor.

016 - Cooperative House for Women - Any institution-owned or institution-controlled housing facility in which female student residents provide a major portion of the housekeeping and food service labor.

017 - Men's Residence and Fraternity Hall - Any type of multi-unit housing facility for unmarried male students in which a portion of the building houses one or more fraternity group(s).

018 - Women's Residence and Sorority Hall - Any type of multi-unit housing facility for unmarried female students in which a portion of the building houses one or more sorority group(s).

019 - Other - Any other type of institution-owned or institution-controlled housing facility that has not been included in the above listing.

Because three columns are provided for the preceding item, it is possible for an institution to record data on any additional categories of building use.

Item 7
(Cols. 26-64)

Types and Amounts of Space: For each type of room described below, insert both the number of such rooms and the total net area, in hundreds of square feet, represented by each type of room. Entries should be to the nearest hundred. For example, 90,512 sq. ft. would be entered as 0905, and 220,162 sq. ft. as 2202.

(Cols. 26-33)

Study-Bedrooms: The student sleeping room (single, double, triple or more) to which students are assigned for sleeping and study quarters. This category may be applied to married student housing and faculty housing as simply "bedrooms." Any general study room or den may be added to this category.

(Cols. 34-38)	Lounges-Recreation Rooms: Any room that is used for general recreation, leisure, or social activities.
(Cols. 39-43)	Kitchen-Dining Rooms: Any room that is used for food preparation, storage, or serving.
(Cols. 44-49)	Toilets-Shower Rooms: Any toilet or washroom or any shower room.
(Cols. 50-54)	Laundry-Service-Storage: Any rooms that are used for laundries, general storage, and utilities.
(Cols. 55-59)	Resident Staff Quarters: Applies only to student dormitories with resident housemothers or professional staff living in the buildings. The total area of these quarters should be listed even though it is a duplication of data listed.
(Cols. 60-64)	Other Rooms: Any type room not covered above.
Item 8 (Cols. 65-68)	Normal Capacity of Building: Insert the number of persons that the building was designed to house during normal use.
Item 9 (Cols. 69-72)	Present Occupancy: Insert the actual number of persons (excluding resident staff in dormitories) housed in the building during the period of study or inventory.
Item 10 (Cols. 73-79)	Reserved for Institutional Use: The institution may wish additional information to be recorded: e.g., total net and/or gross area of the building, type of construction, number of floors, condition of the building, suitability of the building for present use, present occupancy of building, or other data.
Item 11 (Col. 80)	Card Type: Enter here a number or a character to differentiate this card from other types of cards.

General Instructions for Coding Form C

Form C is designed for use in the inventory of nonresidential buildings. One form should be completed for each building visited.

The basic form is designated as a summary and is distinguished from supplementary forms by the use of an entry code in Item 20. The summary form is coded as entry code "0." Supplementary forms are designated by

Chart 11-3. Form Used for Inventory of Nonresidential Buildings

FORM C. NONRESIDENTIAL BUILDING INVENTORY

Date ________

1. **Institution:** ____________________ (Name) ___ ___ ___ ___ 1 4

2. **Building Location:** ___ ___ 5 6

3. **Building Name:** ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ 7 16

4. **Building Number:** ___ ___ ___ ___ 17 20

5. **Inventory Year:** ___ ___ 21 22

6. **Year of Acquisition:** ___ ___ ___ ___ 23 26

7. **Year of Construction:** ___ ___ ___ ___ 27 30

8. **Status of Room Analysis:** ___ 31

Floor Level*	9. No. Rooms Assignable	10. Net Area Assignable (sq.ft.)	11. Gross Area (sq. ft. in hundreds)	12. Net Assignable Area Air Conditioned (sq. ft.)
________	________	________	________	________
________	________	________	________	________
________	________	________	________	________
________	________	________	________	________
________	________	________	________	________
Total	________ 32 35	________ 36 41	________ 42 49	________ 50 55

13. **Number of Floors:** ___ ___ 56 57

14. **Elevator Service:** ___ 58

*Floor level should conform to those floor levels for the building as indicated on Nonresidential Room Analysis (Form A). Page 1 of 2

Chart 11-3. Form Used for Inventory of Nonresidential Buildings, continued

15. Type of Construction: ___ ___
59 60

(1) Wood-frame
(2) Wood-frame with brick veneer
(3) Load-bearing masonry walls with wood floor and roof construction
(4) Load-bearing masonry walls with steel floor and roof construction
(5) Steel frame and non-load-bearing masonry walls
(6) Reinforced concrete frame with non-load-bearing walls
(7) Reinforced concrete walls
(8) Building with steel walls
(9) Other ______________________
Specify

16. Source of Funds: ___ ___
61 62

17. Change Number: ___
63

18. Amount - Book Value of Building: ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
64 73

19. Reserved for Institutional Use: ___ ___ ___ ___ ___
74 78

20. Entry Code: ___
79

21. Card Type: ___
80

the use of codes "1" through "9." Further explanation of the use of the entry code will be found in the material to follow.

One of the major problems faced when attempting to deal with building costs are the varied methods of expressing costs and the necessity of modifying these costs due to additions and renovation of buildings. To allow for these contingencies, a multiple card system has been designed and explained. Due to the uniqueness of this system, it is suggested that careful study be given this explanation in order that maximum flexibility and use be achieved.

In order to facilitate an understanding of this multiple card system, it is suggested that "Form C" card format and the following explanation be reviewed simultaneously.

Basically, the Type 3 card becomes three distinct card groups when considered in conjunction with the entry code. Thus, Type 3 cards become "Type 3 Summary Card" when entry code "0" is used, "Type 3 Financial Card" when entry codes "1" - "8" are used, and "Type 3 Detail Card" when entry code "9" is used.

The information to be included in each of these three groups of cards will be detailed separately.

Note that the entry code "0" contains information concerning the current status of the building. Entry code "1" - "8" contains various statements of the value of the building. Entry code "9" permits an original expression of the source of funds as well as detailed information concerning changes in funds and other aspects of the building due to additions or renovations.

Use of the entry code "9" and source of funds, change number, and year of change give the ability to present a complete picture of the financial history of a building. Use of positive and negative values in Items 9-15 permits one to trace the physical history of the building.

A judicious use of the entry code "9" permits a complete history of the building.

Entry code "0" should always contain the present status of the building.

Entry code "1" - "8" permits the carrying of other possible valuations placed on the building.

Type "3" Entry "0" - Type 3 Summary Card

Item 1 (Cols. 1-4)	Institutional Identification: If a national organization should request data, or possibly a deck of punch cards, a numerical code would be furnished for each participating institution. Otherwise, the institution need not complete this item.
Item 2 (Cols. 5-6)	Building Location: This space is for the use of institutions with more than one campus, or for institutions desiring to divide the campus into areas. The code should be developed by the institution.
Item 3 (Cols. 7-16)	Building Name: This must be abbreviated if more than ten letters are required. Leave one empty space between words if possible. Work from left to right beginning with column 7. If the name or abbreviation does not use all spaces, it is unnecessary to add zeros in the remaining columns.
Item 4 (Cols. 17-20)	Building Number: Every building should be given a permanent number. If an institution does not have a permanent numbering system, the office completing the inventory should assign each building a number for use by the agency requesting the information. This will also expedite sorting and analysis.
Item 5 (Cols. 21-22)	Inventory Year: Enter the last two digits of the calendar year in which the inventory is being made, or if the institution maintains an inventory on a permanent basis, the year of the latest review of the building.
Item 6 (Cols. 23-26)	Year of Acquisition: Enter here the year that the building was acquired by the institution. If newly constructed, enter the year in which the build-

ing was occupied by the institution. If exact year is unknown, make an estimate.

Item 7
(Cols. 27-30)

Year of Construction: Enter here the year that the building was constructed. If the exact date is unknown, make an estimate.

Item 8
(Col. 31)

Status of Room Analysis: This information is to indicate in the building inventory whether a separate analysis of the building by room is required, and, if required, whether the analysis has been completed or is under way.

0 - None
1 - Partial
2 - Complete
3 - Does not apply

Item 9
(Cols. 32-35)

Number of Rooms Assignable: This number should equal the sum of the assignable rooms as shown in the room analysis.

Item 10
(Cols. 36-41)

Net Area Assignable (Sq. ft.): The assignable area of a building is the sum of all areas of the several floors of a building, including basements, mezzanine, intermediate floors, and penthouses of a headroom height of approximately 6'6", measured from the interior surfaces of walls or partitions, and available for assignment to any use. (Note: This is intended to include office, laboratory, classroom, storage, enclosed freight or package receiving or handling. It does not include circulation areas, mechanical rooms, rest-rooms, pipe space, exterior loading docks, or janitor closets.)

Item 11
(Cols. 42-49)

Gross Area (Sq. ft. in Hundreds): The gross area of a building is the sum of the areas of the several floors of the building including basements, mezzanine and intermediate floored tiers, and penthouses of headroom height measured from the exterior faces of exterior walls or from the center line of walls separating buildings. Covered walkways, open, roofed-over areas that are paved, porches, and similar spaces shall have the gross area multiplied by an area factor of 0.50. The gross area does not include such features as pipe trenches, exterior terraces or steps, chimneys, roof overhangs, etc.

Item 12
(Cols. 50-55)

Net Assignable Area Air Conditioned (Sq. ft.): The sum of the net area of assignable space cooled by mechanical refrigeration or evaporative cooling equipment.

Item 13
(Cols. 56-57)

Number of Floors: Enter here the total number of floors which contribute assignable space.

Item 14
(Col. 58)

Elevator Service: Code as follows:

0 - No
1-9 - Yes

Item 15
(Cols. 59-60)

Type of Construction: Code as follows:

1 - Wood-frame - A building constructed of wood or upon a wood-frame.
2 - Wood-frame with Brick Veneer - Brick or other masonry veneer over a wood-frame.
3 - Load-bearing Masonry Walls with Wood Floor and Roof Construction - Roof and upper floors supported by masonry walls, wooden floors, joists, etc.
4 - Load-bearing Masonry Walls with Steel Floor and Roof Construction - Roof and upper floors supported by masonry walls, steel joists, etc., with concrete-tile floors.
5 - Steel Frame and Non-Load-Bearing Masonry Walls - Building supported by steel construction bearing weight of masonry walls. Concrete tile floors.
6 - Reinforced Concrete Frame with Non-Load-Bearing Walls - Building supported by reinforced concrete construction bearing weight of walls. Concrete-tile floors.
7 - Reinforced Concrete Walls - Building constructed of reinforced concrete.
8 - Building with Steel Walls - Sheet iron over demountable steel frame.
9 - Other

Item 16
(Cols. 61-62)

Source of Funds: Leave blank.

Item 17
(Col. 63)

Change Number: Leave blank.

Item 18 (Cols. 64-73)	Amount - Book Value of Building: Enter the cost or appraised value as shown on the plant ledger. The value of the land is not to be included.
Item 19 (Cols. 74-78)	Reserved for Institutional Use: The institution may wish to record additional information, e.g., gross volume of building, suitability of building for present use, present occupancy of building, or other data.
Item 20 (Col. 79)	Entry Code: Use "0" to indicate summary card.
Item 21 (Col. 80)	Card Type: Enter in this column the code "1." This is to indicate that the card is from the Non-Residential Building Inventory as distinguished from the Non-Residential Room Analysis and the Residential Building Inventory.

Type "3" Entry "1" - "8" - Type 3 Financial Card

Item 1 (Cols. 1-4)	Institutional Identification: (Same as entry "0").
Item 2 (Cols. 5-6)	Building Location: (Same as entry "0").
Item 3 (Cols. 7-16)	Building Name: (Same as entry "0").
Item 4 (Cols. 17-20)	Building Number: (Same as entry "0").
Item 5 (Cols. 21-22)	Inventory Year: (Same as entry "0").
Item 6 (Cols. 23-26)	Year of Acquisition: (Same as entry "0").
Item 7 (Cols. 27-30)	Year of Construction: (Same as entry "0").
Item 8 (Col. 31)	Status of Room Analysis: (Same as entry "0").
Item 9 (Cols. 32-35)	Number of Rooms Assignable: (Same as entry "0").
Item 10 (Cols. 36-41)	Net Area Assignable (Sq. ft.): (Same as entry "0").
Item 11 (Cols. 42-49)	Gross Area (Sq. ft. in Hundreds): (Same as entry "0").

Item 12 (Cols. 50-55)	Net Assignable Area Air Conditioned (Sq. ft.): (Same as entry "0").
Item 13 (Cols. 56-57)	Number of Floors: (Same as entry "0").
Item 14 (Col. 58)	Elevator Service: (Same as entry "0").
Item 15 (Cols. 59-60)	Type of Construction: (Same as entry "0").
Item 16 (Cols. 61-62)	Source of Funds: Not applicable. Leave blank.
Item 17 (Col. 63)	Change Number: Not applicable. Leave blank.
Item 18 (Cols. 64-73)	Amount - Book Value of Building: Enter amount corresponding to entry code.
Item 19 (Cols. 74-78)	Reserved for Institutional Use: (Same as entry "0").
Item 20 (Col. 79)	Entry Code: Enter "1" - "8" depending on value as follows: 1 - Appraised Value 2 - Insurance Value 3 - Replacement Value 4-8 - Other values are assigned by institution.
Item 21 (Col. 80)	Card Type: (Same as entry "0").

Type "3" Entry "9" - Type 3 Detail Card

Item 1 (Cols. 1-4)	Institutional Identification: (Same as entry "0").
Item 2 (Cols. 5-6)	Building Location: (Same as entry "0").
Item 3 (Cols. 7-16)	Building Name: (Same as entry "0").
Item 4 (Cols. 17-20)	Building Number: (Same as entry "0").
Item 5 (Cols. 21-22)	Inventory Year: (Same as entry "0").
Item 6 (Cols. 23-26)	Year of Acquisition: (Same as entry "0").

Item 7 (Cols. 27-30)	Year of Construction: Year of change. Enter the year this particular change was effective.
Item 8 (Col. 31)	Status of Room Analysis: (Same as entry "0," except enter net change + or -).
Item 9 (Cols. 32-35)	Number of Rooms Assignable: (Same as entry "0," except enter net change + or -).
Item 10 (Cols. 36-41)	Net Area Assignable (Sq. ft.): (Same as entry "0," except enter net change + or -).
Item 11 (Cols. 42-49)	Gross Area (Sq. ft. in Hundreds): (Same as entry "0," except enter net change + or -).
Item 12 (Cols. 50-55)	Net Assignable Area Air Conditioned (Sq. ft.): (Same as entry "0," except enter net change + or -).
Item 13 (Cols. 56-57)	Number of Floors: (Same as entry "0," except enter net change + or -).
Item 14 (Col. 58)	Elevator Service: (Same as entry "0," except enter net change + or -).
Item 15 (Cols. 59-60)	Type of Construction: (Same as entry "0," except enter net change + or -).
Item 16 (Cols. 61-62)	Source of Funds: Enter fund code developed by institution.
Item 17 (Col. 63)	Change Number: Enter change number developed by institution.
Item 18 (Cols. 64-73)	Amount - Book Value of Building: (Same as entry "0," except enter net change + or -).
Item 19 (Cols. 74-78)	Reserved for Institutional Use: (Same as entry "0").
Item 20 (Col. 79)	Entry Code: Enter "9" indicating detail card.
Item 21 (Col. 80)	Card Type: (Same as entry "0").

IV. Supplementary Materials on Space Utilization Analyses

Data Requirements

Data required for space utilization analyses are listed below. (Items marked with an asterisk are optional.)

1. Institutional Identification
2. Building Identification
3. Room Identification
4. Number of Stations in Room

*5. Optimum Number of Stations in Room

*6. Assignable Square Feet in Room

*7. Type of Instructional Room

*8. Departmental Identification of Course

*9. Course Number Identification

*10. Days of the Week Course is Offered

*11. Beginning Hour of Course

*12. Ending Hour of Course

13. Number of Days Per Week Course is Offered

14. Number of Hours Per Week Course is Offered

15. Number of Students Enrolled in Course (in this room)

*16. Number of Hours Per Week Room is Not Available For Instruction

*17. Room Size Code

*18. Number of Students Code

*19. Program Code

Derived Measures

1. Average number of room periods of use per week:

   Divide total room periods of use (for a group of rooms) by total number of rooms.

2. Percentage of station utilization for room(s) assigned for use:

A. For Each Room. Multiply total room periods of use per week (actual) by number of student stations to obtain total possible student station periods when room is in use per week. Then divide total student station periods that room is occupied per week by the total possible student station periods when room is in use and multiply by 100 to obtain a percentage of student station use when room is actually used. (Obtain total student station periods that room is occupied per week by multiplying the enrollment of each class that meets in the room by the number of periods it meets in the room per week and sum the results for all classes that use the room.) Example: A room is actually used 32 periods per week. It has a capacity of 108 student stations. There are a total of 1,878 student station periods occupied per week. (To obtain total student station periods: One class, with 62 enrolled, meets in the room three hours each week, giving a total of 186 student station periods for this one class. The enrollment of each additional class that meets in the room multiplied by the number of periods it meets would bring, in this example, the student station periods per week to a total of 1,878.) Therefore, 32 x 108 = 3,456. Then, 1,878 ÷ 3,456 = .5434 x 100 = 54.34 percent.

B. For a Group of Rooms. Sum the total actual student station periods that rooms are occupied per week for all classes that use the rooms and divide by the sum of the total possible student station periods when rooms are in use and multiply by 100. The result is the percentage of station utilization for the group of rooms.

3. Optional Measures:
   - A. 1 and 2 above by day of week and/or hour of day
   - B. 1 and 2A above by type of room
   - C. 1 and 2A above by program (day versus evening)
   - D. 1 and 2 above adjusted for blocked time
   - E. Matrix of room capacities versus size of classes scheduled in rooms.

CHAPTER 12

FACILITIES DATA: EQUIPMENT

I. General

The supplementary materials in this chapter begin with forms and instructions for the inventory of fixed equipment. Items of fixed or built-in equipment are relatively permanent features of building space. Their costs are usually included in building costs and, typically, their useful life is the same as that of the room or building in which they are installed. However, since fixed equipment may be replaced, added, or removed, thereby changing some characteristics of the physical space, methods of describing fixed equipment are desirable. These forms and instructions also serve as a kind of conceptual "bridge" between the inventories of buildings and rooms and the inventory of equipment.

Other supplementary materials include a list of maximum and minimum data for the inventory of movable equipment, a detailed discussion of typical equipment inventory objectives and the data related to each objective, and a summary list of inventory objectives and data requirements. In addition, techniques for handling selected special problems in the inventory of movable equipment are discussed. The special problems selected for comment are the inventory of groups of identical items, methods of marking equipment, and the inventory treatment of institutionally constructed equipment.

II. Forms and Instructions for the Inventory of Fixed Equipment

The forms and instructions presented in this section illustrate one method of describing fixed equipment and some aspects of room characteristics. The forms have been tested and used at the medical center of one of the institutions within the Project Group. They are designed to record data about salient features of such diverse spaces as research laboratories and in-patient rooms, classrooms and offices, storerooms and lecture halls. Immediately after the first page of instructions for each form, a copy of the respective form will be found.

Data about fixed equipment are useful in describing stable characteristics of rooms and for planning to remodel or convert them to new types of space. Institutions must report some of these data to outside agencies when making certain types of grant requests, especially requests for funds for facilities development. However, it should be noted, that, at present, there is no routine or regular reporting of these data to outside agencies, and that there is probably little practical value to having these data in punched cards. Nevertheless, the recording of data on the forms in this section will provide for the possibility that an institution may be confronted by a definite reason for using punched cards in the future.

The forms may be considered a checklist of items which should appear on a fixed equipment inventory, and the codes within each item may be considered an illustration of some ways in which the items may be described.

Since data concerning fixed equipment are more closely related to building space than to movable equipment inventories, the forms presented here for recording data (Forms D and E) have been developed to supplement the building and room inventory forms (Forms A, B and C) presented in Chapter 11. The fixed equipment and room characteristic forms may be used in inventorying either nonresidential or residential space. Although separately labeled, Forms D and E do not differ in purpose or in any respect but data contents; Form E is a continuation of Form D.

Instructions for Coding Form D

Form D is designed for use in the inventory of fixed equipment and other relatively permanent characteristics of non-residential and residential rooms. One form should be completed for each room visited.

Item 1 (Cols. 1-6)	Room Number: Insert here the number of the room under study. Alphabetic letters may be included along with numbers.
Item 2 (Col. 7)	Floor Structure: Insert material of which floor is made, using code: 1 - Wood 2 - Concrete 9 - Other
Item 3 (Col. 8)	Floor Surface: Insert material with which floor is surfaced, using code: 1 - Wood 2 - Terrazzo 3 - Concrete 4 - Resilient Tile 5 - Ceramic Tile 9 - Other
Item 4 (Col. 9)	Floor Covering: Indicate what material, if any, covers floor, using code: 0 - None 1 - Carpet 9 - Other
Item 5 (Col. 10)	Wall Structure: Insert, using code, material of which walls are made. 1 - Masonry 2 - Wood Stud 3 - Metal Stud 4 - Movable 9 - Other
Item 6 (Col. 11)	Wall Surface: Insert material with which walls are finished, using code: 0 - No finish 1 - Plaster 2 - Drywall 3 - Wood 9 - Other
Item 7 (Col. 12)	Wall Covering: Insert materials with which walls are covered, using code: 0 - No covering 1 - Paint 2 - Vinyl 3 - Wood Paneling 9 - Other
Item 8 (Col. 13)	Ceiling: Using code, insert information about ceiling construction. 1 - Unsuspended, Plaster 2 - Unsuspended, Drywall 3 - Unsuspended, Acoustical Tile 4 - Unsuspended, Other

Chart 12-1. Form Used for Fixed Equipment and Room Analysis

FORM D. FIXED EQUIPMENT AND ROOM ANALYSIS

Date ________

Institution ____________________
(Name)

1. Room Number: ___ ___ ___ ___ ___ ___ 1 6
2. Floor Structure: (1) Wood, (2) Concrete, (9) Other ___ 7
3. Floor Surface: ___ 8
4. Floor Covering: (0) None, (1) Carpet, (9) Other ___ 9
5. Wall Structure: ___ 10
6. Wall Surface: ___ 11
7. Wall Covering: ___ 12
8. Ceiling: ___ 13
9. Heating System Type: ___ 14
10. Cooling System Type: ___ 15
11. Ventilating System Type: ___ 16
12. Fluorescent Illumination: ___ 17
13. Fluorescent Illumination, Emergency Electrical System: ___ 18
14. Incandescent Illumination: ___ 19
15. Incandescent Illumination, Emergency Electrical System: ___ 20
16. Natural Illumination: ___ 21
17. Plug Mold (total lin. ft.): ___ ___ 22 23
18. Plug Mold, Emergency Electrical System: ___ 24
19. Number of Convenience Outlets: ___ ___ ___ 25 27
20. Convenience Outlets, Emergency Electrical System: ___ 28
21. Number of 208/220 Single-Phase Outlets: ___ 29
22. 208/220 Single-Phase Outlets, Emergency Electrical System: ___ 30
23. Number of 208/220 Three-Phase Outlets: ___ 31
24. 208/220 Three-Phase Outlets, Emergency Electrical System: ___ 32

Page 1 of 3

Chart 12-1. Form Used for Fixed Equipment and Room Analysis, Continued

25. Electric Panel (total amperage): $\overline{33}\ \overline{\quad}\ \overline{35}$

26. Electric Panel, Emergency Electrical System: $\overline{36}$

27. Number of Permanent Telephones: $\overline{37}$

28. Number of Telephone Outlets: $\overline{38}$

29. Number of Telephone Terminal Panels: $\overline{39}$

30. Number of Water Outlets: $\overline{40}\ \overline{41}$

31. Water, Temperature: $\overline{42}$

32. Water, Special: $\overline{43}$

33. Sink: Number $\overline{44}\ \overline{45}$ Type $\overline{46}$ Valve $\overline{47}$ Trap $\overline{48}$

34. Sink: Number $\overline{49}\ \overline{50}$ Type $\overline{51}$ Valve $\overline{52}$ Trap $\overline{53}$

35. Sink: Number $\overline{54}\ \overline{55}$ Type $\overline{56}$ Valve $\overline{57}$ Trap $\overline{58}$

36. Number of Urinals: $\overline{59}\ \overline{60}$

37. Number of Water Closets without Bed Pan Flush: $\overline{61}$

38. Number of Water Closets with Bed Pan Flush: $\overline{62}$

39. Number of Steam Sterilizers: $\overline{63}$

40. Number of Dry Air Sterilizers: $\overline{64}$

41. Number of Gas Sterilizers: $\overline{65}$

42. Number of Bed Pan Sanitizers: $\overline{66}$

43. Music System: $\overline{67}$

44. Loudspeaker/Paging: (0) No, (1) Yes $\overline{68}$

45. Nurses' Call: $\overline{69}$

46. Intercom: (0) No, (1) Yes $\overline{70}$

47. Fire Alarm: $\overline{71}$

48. Fire Hose: $\overline{72}$

Chart 12-1. Form Used for Fixed Equipment and Room Analysis, Continued

49. Fire Extinguisher: (0) None, (1) Foam, (2) Soda-Acid, (9) Other $\overline{73}$

50. Fire Detector: (0) None, (1) Smoke, (2) Heat $\overline{74}$

51. Sprinkling System: (0) None, (1) Wet Pipe, (2) Dry Pipe $\overline{75}$

52. Pneumatic Tube Station: $\overline{76}$

53. Dumbwaiter Station: $\overline{77}$

54. Dumbwaiter Type: $\overline{78}$

55. Other Conveying System Station: (0) No, (1) Yes $\overline{79}$

56. Card Number: $\overline{80}$

5 - Suspended, Plaster
6 - Suspended, Drywall
7 - Suspended, Acoustical Tile
8 - Suspended, Other
9 - Unfinished, Other

Item 9
(Col. 14)

Heating System: Indicate type, using code:
0 - None
1 - Direct Radiation, Steam
2 - Direct Radiation, Hot Water
3 - Warm Air -- Forced Flow Cabinet
4 - Warm Air -- Central Ductwork System
5 - Electric Radiant Heater
6 - Radiant Panel, Hot Water
7 - Radiant Panel, Electric
8 - Combination Heating - Cooling, Cabinet-type Unit
9 - Other

Item 10
(Col. 15)

Cooling System: Indicate type, using code:
0 - None
1 - Central Ductwork System
2 - Chilled Water Cabinet-type Unit
3 - Through-the-Wall, Self-contained, Cabinet-type Unit
4 - Window-type Unit
5 - Self-contained Package Unit - Water Cooled
6 - Self-contained Package Unit - Air Cooled
8 - Combination Heating-Cooling, Cabinet-type Unit
9 - Other

Item 11
(Col. 16)

Ventilating System: Indicate type, using code:
0 - None
1 - Central Ductwork System
2 - Individual Exhaust Fan

Item 12
(Col. 17)

Fluorescent Illumination: Indicate type, using code:
0 - None
1 - Surface
2 - Suspended
3 - Recessed
9 - Other

Item 13
(Col. 18)

Fluorescent Illumination, Emergency Electrical System: Indicate status, using code:
0 - No Standby Power
1 - Critical I
2 - Critical II
3 - General

Item 14
(Col. 19)

Incandescent Illumination: Indicate type, using code:

0 - None
1 - Surface
2 - Suspended
3 - Recessed
4 - Surgical Type
9 - Other

Item 15
(Col. 20)

Incandescent Illumination, Emergency Electrical System: Indicate status, using code:

0 - No Standby Power
1 - Critical I
2 - Critical II
3 - General

Item 16
(Col. 21)

Natural Illumination: Indicate type, using code:

0 - None
1 - Windows
2 - Skylight
9 - Other

Item 17
(Cols. 22-23)

Plug Mold: Insert total linear feet of plug mold, 110 volt.

Item 18
(Col. 24)

Plug Mold, Emergency Electrical System: Indicate status of plug mold, using code:

0 - No Standby Power
1 - Critical I
2 - Critical II
3 - General

Item 19
(Cols. 25-27)

Convenience Outlets: Insert number of 110-volt outlets in room.

Item 20
(Col. 28)

Convenience Outlets, Emergency Electrical System: Indicate status of 110-volt electrical outlets, using code:

0 - No Standby Power
1 - Critical I
2 - Critical II
3 - General

Item 21
(Col. 29)

208/220 - Single-Phase Outlets: Insert number.

Item 22
(Col. 30)

208/220 - Single-Phase Outlets, Emergency Electrical System: Indicate status, using code:

0 - No Standby Power
1 - Critical I
2 - Critical II
3 - General

Item 23
(Col. 31)

208/220 - Three-Phase Outlets: Insert number.

Item 24 (Col. 32)	208/220 - Three-Phase Outlets, Emergency Electrical System: Indicate status, using code: 0 - No Standby Power 1 - Critical I 2 - Critical II 3 - General
Item 25 (Cols. 33-35)	Electric Panel: Insert total amperage of sources of electric power lines.
Item 26 (Col. 36)	Electric Panel, Emergency Electrical System: Indicate status, using code: 0 - No Standby Power 1 - Critical I 2 - Critical II 3 - General
Item 27 (Col. 37)	Telephone: Indicate number of permanent instruments, not extensions, in room.
Item 28 (Col. 38)	Telephone Outlets: Indicate number of telephone outlets, not instruments, in room.
Item 29 (Col. 39)	Telephone Terminal Panels: Indicate number of telephone terminal panels in room.
Item 30 (Cols. 40-41)	Water Outlets: Insert total number of water outlets in room.
Item 31 (Col. 42)	Water, Temperature: Indicate availability of water outlets by temperature, using code: 1 - Hot 2 - Cold only 3 - Chilled 4 - Tempered 5 - Hot and Cold 6 - Hot, Cold and Chilled 7 - Hot, Cold and Tempered 8 - Hot, Cold, Chilled and Tempered
Item 32 (Col. 43)	Water, Special: Indicate availability of special types of water in room, using code: 1 - Distilled Only 2 - Demineralized Only 3 - Filtered Only 4 - Distilled and Demineralized 5 - Distilled and Filtered 6 - Demineralized and Filtered 7 - Distilled, Demineralized and Filtered 0 - None of above

Item 33
(Cols. 44-48)

Sink: Insert number of same type of sink (Cols. 44 and 45). Indicate, by use of code, the type of sink (Col. 46):

0 - Lavatory
1 - Clinic (Flushing Rim)
2 - Cup
3 - Cup -Acid/Corrosion Resistant
4 - Laboratory
5 - Laboratory-Acid/Corrosion Resistant
6 - Scrub
7 - Service
9 - Other

Also, insert type of valve (Col. 47), using code:

1 - Hand
2 - Wrist
3 - Knee
4 - Foot

And type of trap (Col. 48), using code:

0 - No Trap
1 - Conventional
2 - Plaster
3 - Grease
4 - Acid/Corrosion Resistant

Item 34
(Cols. 49-53)

Sink: If a room contains more than one type of sink, use this field for the second type. Insert number of sinks (Cols. 49-50), type of sink (Col. 51), type of valve (Col. 52), and type of trap (Col. 53), using codes given for Item 33.

Item 35
(Cols. 54-58)

Sink: If a room contains more than two types of sinks, use this field for an additional type. Insert number of sinks (Cols. 54-55), type of sink (Col. 56), type of valve (Col. 57), and type of trap (Col. 58), using codes given for Item 33.

Item 36
(Cols. 59-60)

Urinals: Insert number.

Item 37
(Col. 61)

Water Closet without Bed Pan Flush: Insert number.

Item 38
(Col. 62)

Water Closet with Bed Pan Flush: Insert number.

Item 39
(Col. 63)

Steam Sterilizers: Insert number.

Item 40
(Col. 64)

Dry Air Sterilizers: Insert number.

Item 41
(Col. 65)

Gas Sterilizers: Insert number.

Item 42
(Col. 66)

Bed Pan Sanitizers: Insert number.

Item 43
(Col. 67)

Music System: Indicate presence of speaker or reproducer of music and other entertainment, using code:

1 - Radio
2 - Television
3 - Phonograph
4 - Tape Recorder
5 - Wired Music
6 - Combination of Above

Item 44
(Col. 68)

Loudspeaker/Paging: Indicate presence of call system in room, using code:

0 - No
1 - Yes

Item 45
(Col. 69)

Nurses' Call: Indicate presence of call system in room, using code:

0 - No
1 - Signal/Visual
2 - Signal/Voice
9 - Other

Item 46
(Col. 70)

Intercom: Indicate presence of any two-way communication system, other than telephones, using code:

0 - No
1 - Yes

Item 47
(Col. 71)

Fire Alarm: Indicate presence of fire alarm in room, using code:

0 - None
1 - Pull Down/Initiating Station
2 - Bell-type
9 - Other

Item 48
(Col. 72)

Fire Hose: Indicate whether fire hose is installed in room, using code:

0 - No
1 - Fire Hose Only
2 - Connection for Fire Department Hose Only
3 - Fire Hose and Connection for Fire Department Hose

Item 49
(Col. 73)

Fire Extinguisher: Insert type of extinguisher in room, using code:

0 - None
1 - Foam
2 - Soda-Acid
9 - Other

Item 50
(Col. 74)

Fire Detector: Insert type of fire detection system in room, using code:

0 - None
1 - Smoke
2 - Heat

Item 51 (Col. 75)	Sprinkling System: Insert type of sprinkling system in room, using code: 0 - None 1 - Wet Pipe 2 - Dry Pipe
Item 52 (Col. 76)	Pneumatic Tube Station: Indicate presence in room, using code: 0 - None 1 - Send and Receive 2 - Send Only 3 - Receive Only
Item 53 (Col. 77)	Dumbwaiter Station: Indicate presence in room, using code: 0 - None 1 - Send and Receive 2 - Send Only 3 - Receive Only
Item 54 (Col. 78)	Dumbwaiter Type: Indicate type of dumbwaiter station, using code: 0 - None 1 - Send and Receive 2 - Send Only 3 - Receive Only
Item 55 (Col. 79)	Other Conveying System Station: Insert yes or no: 0 - No 1 - Yes
Item 56 (Col. 80)	Card Number: Insert here the alphabetic designation of the card, "D."

Instructions for Coding Form E

Form E is designed for use in the inventory of fixed equipment and other relatively permanent characteristics of non-residential and residential rooms. One form should be completed for each room visited. Form E is a continuation of Form D.

Item 1 (Cols. 1-6)	Room Number: Insert the number of the room under study. Alphabetic letters may be included along with numbers.
Item 2 (Cols. 7-12)	Casework: Insert the type of material of which the casework is made (Col. 7), using code: 1 - Wood 2 - Metal 9 - Other Also, indicate whether casework is open or closed (Col. 8), using code: 0 - Open 1 - Closed

Chart 12-2. Form Used for Fixed Equipment and Room Analysis

FORM E. FIXED EQUIPMENT AND ROOM ANALYSIS

Date ________

Institution ____________________
(Name)

1. Room Number: ___ ___ ___ ___ ___ ___
1 6

2. Casework: Material ___ Open/Closed ___ Size ___
7 8 9

Length (ft.) ___ ___ ___
10 12

3. Casework: Material ___ Open/Closed ___ Size ___
13 14 15

Length (ft.) ___ ___ ___
16 18

4. Casework: Material ___ Open/Closed ___ Size ___
19 20 21

Length (ft.) ___ ___ ___
22 24

5. Casework: Material ___ Open/Closed ___ Size ___
25 26 27

Length (ft.) ___ ___ ___
28 30

6. Casework: Material ___ Open/Closed ___ Size ___
31 32 33

Length (ft.) ___ ___ ___
34 36

7. Work Counters: Length (ft.) ___ ___ ___
37 39

8. Work Counter Surface: ___
40

9. Fume Hood Counter Material: ___
41

10. Fume Hood Opening: Length (in.) ___ ___ ___
42 44

Height (in.) ___ ___ ___
45 47

11. Fume Hood Compressed Air: (0) No, (1) Yes ___
48

Page 1 of 2

Chart 12-2. Form Used for Fixed Equipment and Room Analysis, Continued

---

12. Fume Hood Electric Outlets: (0) No, (1) Yes $\overline{49}$

13. Fume Hood Natural Gas: (0) No, (1) Yes $\overline{50}$

14. Fume Hood Steam: (0) No, (1) Yes $\overline{51}$

15. Fume Hood Vacuum: (0) No, (1) Yes $\overline{52}$

16. Fume Hood Exhaust: (0) Central Exhaust, (1) Individual Blower $\overline{53}$

17. Number of Natural Gas Outlets: $\overline{54}$ $\overline{55}$

18. Number of Compressed Air Outlets: $\overline{56}$ $\overline{57}$

19. Compressed Air Pressure: (1) up to 25 lbs./sq. in.
    (2) over 25 lbs./sq. in. $\overline{58}$

20. Number of Vacuum Outlets: $\overline{59}$ $\overline{60}$

21. Number of Oxygen Outlets: $\overline{61}$ $\overline{62}$

22. Number of Nitrous Oxide Outlets: $\overline{63}$ $\overline{64}$

23. Number of Steam Outlets: $\overline{65}$ $\overline{66}$

24. Steam Outlet Pressure: (1) up to 15 lbs./sq. in.
    (2) over 15 lbs./sq. in. $\overline{67}$

25. Closets (total lin. ft.): $\overline{68}$ — $\overline{70}$

26. Tackboard (lin. ft.): $\overline{71}$ — $\overline{73}$

27. Reach-in Refrigerators (total cu. ft.): $\overline{74}$ — $\overline{76}$

28. Reach-in Freezers (total cu. ft.): $\overline{77}$ — $\overline{79}$

29. Card Number: $\overline{80}$

Page 2 of 2

And, insert size (height & depth) of casework (Col. 9), using code:

- 0 - Wall cabinet, 30" x 12" - 14"
- 1 - Wall cabinet, 36" x 12" - 14"
- 2 - Base cabinet, 30" x 22" - 24"
- 3 - Base cabinet, 36" x 22" - 24"
- 4 - Base cabinet, 72" - 78" x 11" - 15"
- 5 - Base cabinet, 72" - 78" x 16" - 21"
- 6 - Base cabinet, 72" - 78" x 22" - 24"
- 7 - Base cabinet, 79" - 84" x 11" - 15"
- 8 - Base cabinet, 79" - 84" x 16" - 21"
- 9 - Base cabinet, 79" - 84" x 22" - 24"
- X - Other

And, insert length (in feet) of casework (Cols. 10-12).

Item 3
(Cols. 13-18)

Casework: When a room contains more than one type of casework, use preceding codes and this field for the second type. Insert type of material (Col. 13), open or closed (Col. 14), size (Col. 15), and length (Cols. 16-18).

Item 4
(Cols. 19-24)

Casework: When a room contains more than two types of casework, use preceding codes and this field for the third type. Insert type of material (Col. 19), open or closed (Col. 20), size (Col. 21), and length (Cols. 22-24).

Item 5
(Cols. 25-30)

Casework: When a room contains more than three types of casework, use preceding codes and this field for the fourth type. Insert type of material (Col. 25), open or closed (Col. 26), size (Col. 27), and length (Cols. 28-30).

Item 6
(Cols. 31-36)

Casework: When a room contains more than four types of casework, use preceding codes and this field for the fifth type. Insert type of material (Col. 31), open or closed (Col. 32), size (Col. 33), and length (Cols. 34-36).

Item 7
(Cols. 37-39)

Work Counters: Insert length (in feet).

Item 8
(Col. 40)

Work Counter Surface: Insert type of surface of work counter, using code:

- 1 - Wood
- 2 - Metal
- 3 - Plastic
- 4 - Acid/Corrosion Resistant
- 9 - Other

Item 9
(Col. 41)

Fume Hood Counter Material: Describe counter surface of fume hood, using code:

- 1 - Wood
- 2 - Metal
- 3 - Plastic
- 4 - Acid/Corrosion Resistant
- 9 - Other

Item 10 (Cols. 42-47)	Fume Hood Opening: Indicate length (in inches) and height (in inches) of fume hood opening.
Item 11 (Col. 48)	Fume Hood Compressed Air:) Indicate presence or absence of utility using code: 0 - Absent or No 1 - Present or Yes
Item 12 (Col. 49)	Fume Hood Electric Outlets:)
Item 13 (Col. 50)	Fume Hood Natural Gas:)
Item 14 (Col. 51)	Fume Hood Steam:)
Item 15 (Col. 52)	Fume Hood Vacuum:)
Item 16 (Col. 53)	Fume Hood Exhaust: Insert, using code: 0 - Central Exhaust 1 - Individual Blower
Item 17 (Cols. 54-55)	Natural Gas Outlets:) Insert number contained in room, including those associated with fume hood.
Item 18 (Cols. 56-57)	Compressed Air Outlets:)
Item 19 (Col. 58)	Compressed Air Pressure: Insert pressure of outlets, using code: 1 - Low (up to 25 lbs./sq.in.) 2 - High (over 25 lbs./sq.in.)
Item 20 (Cols. 59-60)	Vacuum Outlets:) Insert number contained in room, including those associated with fume hood.
Item 21 (Cols. 61-62)	Oxygen Outlets:)
Item 22 (Cols. 63-64)	Nitrous Oxide Outlets:)
Item 23 (Cols. 65-66)	Steam Outlets:)
Item 24 (Col. 67)	Steam Outlet Pressure: Insert pressure, using code: 1 - Low (up to 15 lbs. per sq. in.) 2 - High (over 15 lbs. per sq. in.)
Item 25 (Cols. 68-70)	Closets: Insert total linear feet of closet space.
Item 26 (Cols. 71-73)	Tackboard: Insert total linear feet.

Item 27 (Cols. 74-76)	Reach-in Refrigerators: Insert total cubic feet of storage space (length x height x width).
Item 28 (Cols. 77-79)	Reach-in Freezers: Insert total cubic feet of storage space (length x height x width).
Item 29 (Col. 80)	Card Number: Insert here alphabetic designation of card, "E."

III. Supplementary Materials on Inventory Data Requirements and Objectives

List of Maximum and Minimum Inventory Data

The following list of maximum and minimum data was derived from the results of the survey on the status of equipment inventories in colleges and universities described in Chapter 6. The asterisked items are those judged as minimum for an effective operation.

A. Document References: This includes identification numbers of whatever ordering and paying documents the institution feels are necessary to have for cross reference and internal business operations.

1. Requisition Number

*2. Invoice Number

3. Claim Number

4. Warrant Number

B. Identification: These items serve to identify the ledger entry with the physical item.

1. Item Name - In some inventory systems, it is desirable to print the common name of the article for easy identification, particularly when cards are distributed to departments to enable them to check their inventory. In most cases, the common name will be the same as the class name in the item code; for example, typewriter, desk, or chair.

*2. Item Code - This is a number used to identify the equipment by group and class. (See brief description of the University of California Class Codes, under the heading "Screening for Equipment on Hand," later in this chapter.)

*3. Inventory Number - This is a number assigned by the institution which is a unique number and which is affixed, if possible, to the item of equipment.

*4. Quantity - This is used when several items are grouped in a single entry or on a single card.

5. Reordering Information - This includes such information as manufacturer's name, model number, type, and manufacturer's serial number. Although these data are sometimes useful in identifying equipment, they are most useful in reordering.

C. Location: This information describes the physical location of the equipment and is usually represented by a code number which may include the following

1. District - This is used particularly by community colleges and junior colleges which are part of school districts.

2. Campus - Indicated here would be information about whether the equipment was on campus or off campus (where off campus), or on which of several campuses, or in resident centers.

3. Area - Some institutions may find it desirable to give a general indication of the area on the campus in which the item is located.

*4. Building

5. Room

D. Assignment of Responsibility: This information identifies the college, department, division, or individual responsible for the equipment.

1. Campus

2. College

*3. Department or Division

4. Contract Number

5. Man Number

E. Financial Information: Gathered here are data pertinent to the costs of the equipment.

*1. Chart of Accounts Code - This code would represent the budgetary category from which funds were drawn to pay for the equipment.

*2. Initial Cost of the Equipment

3. Cost of Installation

*4. The Appraised Value - When initial cost of an item is not available, it is sometimes necessary to affix an appraised value to the item.

*5. Construction Cost - This cost would be used when the item was constructed by the institution itself, and in the case of modified equipment, the initial cost plus modification costs would represent the final cost of the item.

6. Shipping Charges

7. Depreciation Rate or Life Expectancy

*8. Source of Funds -

   a. Federal (with the agency designated by code, if possible)

   b. Local Institutional Funds

   c. Private Gifts and Grants

   d. Revenue, Bonds, and Notes

   e. Endowment Income

   f. State Appropriations

   g. Other Sources

   h. Undetermined

F. Special Information:

*1. Date of Acquisition - This would indicate the quarter, trimester, or semester and the year in which the item was acquired.

*2. Title Holder -

   a. Institution

   b. Federal Agency (identified by code)

   c. Federal Agency with Title Provisions

   d. Rental or Lease

   e. Leased with Sale Provisions

   f. Loaned (loaner identified by code)

*3. Disposition -

   a. Lost

   b. Stolen

   c. Traded In

   d. Sold

   e. Cannibalized

   f. Merged into Another Unit

   g. Obsolete

   h. Surplus (or excess of needs)

*4. Date of Disposal: The quarter or semester and year in which the item was relinquished.

*5. Probable Function: When the function[1] of the equipment is readily identifiable and reasonably permanent, it should be coded in the following manner -

   a. Instruction

   b. Teaching-Research

   c. Research and Development

   d. Creative Activity in Art and Scholarship

   e. Teaching Through Creative Activity in Art and Scholarship

   f. Public Service

   g. Supporting Services

6. Condition: Some indication of the condition of the equipment, such as "good," "fair," "should be replaced" would appear here. Because this information needs periodic updating, all schools may not wish to maintain it.

7. Remarks: This category is used for indicating certain special information about equipment.

---

[1] These functions are based on the list of institutional activities developed in Chapter 8 and reflected in Zone 5 of the Data Organization chart.

a. Item Used as a Component

b. Mobile Item (moved from room to room frequently)

c. Item Used Jointly by Two or More Departments

d. Item Purchased for Special Project

e. Item Performing Dual Functions

Typical Inventory Objectives and Related Data

Identifying Equipment

Basically, identifying equipment means matching an entry in the file against a piece of equipment in the possession or keeping of the institution. It also implies that the institution's equipment can be distinguished from noninstitutional equipment. To accomplish this, each piece of equipment that can be marked should be marked with an identifying number. Except in the case of group items, a unique number is assigned to each piece. If both institutionally owned equipment and equipment not owned by the institution but in the keeping of the institution are to be marked, the two types should be distinguished. This can be done by a numerical or alphabetical prefix (e.g., 1-25012 or A-25012 being institutionally owned, and 2-25012 or B-25012 being noninstitutionally owned). It can also be done by using different colored decals. (Marking methods are discussed under "Miscellaneous Methodologies," a later section of this chapter.)

With the identification number should be a description of the item for convenience in recognizing it. This may be a series of standard alphabetical abbreviations strung together to provide a nomenclature for the item. A typical entry for a left-hand, metal, secretarial desk with an auxiliary extension table might be Desk, Sect., MTL., LH, w/AUX T. The same identification can be made with a numerical code. If space is a factor, the numerical code description is perhaps the best, for such a code will not only describe the item, but can also be used to screen for a particular type of equipment. It is important not to confuse identification codes with description codes; the former provides a unique label for each item, the latter a unique label describing a class of items. Thus, if all desks are coded class 100, and secretarial desks are subclass 110, and 111 designates a metal desk with an auxiliary table, not only is the item thereby described, but it is also categorized for other purposes such as screening.

Name of manufacturer, brand number, model number, and manufacturer's serial number are also helpful in identifying a particular item. However, if care has been taken in assigning unique numbers, assembling this additional descriptive matter may be unnecessary, particularly if a well defined audit trail has been established in the system. Such information as model number or manufacturer's name can be established by tracing back to the ordering or paying documents.

Locating Equipment

For locating equipment physically, a college or department number may be sufficient, but building and room data are also desirable. Some institutions record relocations of equipment between buildings; few attempt to keep up with changes between rooms within the same building.

Other designations apply to locating equipment. A central property office for a university system would also need to designate on which campus equipment was located. Some institutions have more than one campus and these should be designated separately. On-campus and off-campus designations may be desirable for institutions with extension and research facilities in areas other than the immediate campus.

It may also be desirable to indicate the general location of the item on the campus, particularly if it is a large campus.

Determining Responsibility

Usually a department code is all that is necessary to establish responsibility for an item. Occasionally, the man number or name of the individual responsible for the item may be desirable, particularly when a project director is responsible for equipment used by his research group.

If responsibility for missing items is to be expressed in a dollar amount, it is necessary to carry the initial cost or value of the item and its purchase or acquisition date. From such information an estimate of the worth of the item can be reached. Some institutions find it helpful to designate the condition of a piece of equipment. Such information, however, needs periodic updating in order to make it valid and may be more expensive to maintain than it has value in the system.

Screening for Equipment on Hand

Screening is a process whereby equipment files can be searched to determine if a piece of equipment is owned or held by the institution and, if so, who holds it.

The basis of a screening method is to identify certain types of equipment. If the abbreviated alphabetical title, previously discussed, is carefully constructed and consistency is maintained, it becomes possible to arrange property records in alphabetical order by descriptive titles. Departments holding particular items can then be identified. However, the descriptive title becomes over-cumbersome if many subcategories are required. Also, complete consistency is difficult to maintain in abbreviated alphabetical descriptions, particularly if there are many models and types for a given class of equipment. Perhaps the most serious drawback to the method is the limitation imposed on the arrangement of subcategories by such a method. It is virtually impossible, for example, to bring all electrical or food service equipment together for analysis using a descriptive title as a basis.

A more satisfactory method can be devised by creating a numbering system for groups, classes, and subclasses of equipment. A number of such classification methods are currently available. Three, in particular, merit brief description here.

The Association for Educational Data Systems has published the _Property Classification Code Manual_ (Special Publication No. 072, January 1963) describing a system which classifies equipment according to the industry manufacturing the equipment. Codes have been worked out in some detail for many classes of equipment.

This system of coding is designed primarily for elementary and high schools. It is capable of modification into a system for institutions of higher education, but property officers would find that a great deal of expansion of the manual would be necessary, particularly for laboratory and scientific equipment.

Further, the classification code developed by this system is somewhat long as it now stands, requiring ten digits. It should be pointed out, however, that the ten-digit code is capable of describing such things as style, finish, size, and material of construction. These are details not commonly found in typical descriptive codes.

It appears possible to shorten the code somewhat and still retain its possibilities as a screening device. Many institutions, unless they use a descriptive code for reordering purposes, may not wish the amount of detail that the code presently provides.

The Department of Defense publishes the *Federal Supply Classification Handbooks*. The coding system contained in these handbooks divides equipment into 76 groups and into numerous subclasses within these groups, by means of a four-digit code. One advantage of this system is that it is fully cross referenced by class and by alphabetical description. Further, it lists descriptive titles for a great variety of equipment, a much greater variety than would usually be found at an institution of higher education. Such descriptive titles can form the basis for an abbreviated descriptive label. Another advantage is that updating is periodically supplied by the publisher as new types of equipment are classified.

This system does have some disadvantages. It is designed for the Armed Forces and, therefore, would need some modification by educational institutions. Further, the classes of equipment listed in the handbook are rather broad. For example, Office Furniture (Class 7110) contains chairs, desks, files, racks, safes, stands, stools, and tables, as well as other items. Most institutions would want to differentiate among these items for screening purposes. To do this, it would be necessary to add at least another two digits to create subclasses.

A third system for coding equipment into groups and classes has been designed by the University of California. It uses a six-digit code. The first two digits define classes of equipment. Class 43, for example, contains motor vehicles. The next four digits define subclasses. Class 43-1210 is a two-door Chevrolet sedan; 43-1211 a two-door Dodge sedan. The coding system also gives standardized abbreviated descriptive titles for each subclass in the list. Since this coding system has been designed primarily for institutions of higher education, it is obviously the most useful of the three methods reviewed. As of the time of this writing, it has not been published.

Along with a class and subclass code it is also desirable to record other pertinent information to further identify differences in equipment. Electric motors should have their horsepower ratings recorded, and storage tanks their gallon or cubic foot capacities indicated. In some instances, it may be desirable to show the manufacturer's name, as in the case of vehicles. Such information can be made a part of the class and subclass code or it can be recorded separately. If it is built into the code, the screening process becomes simplified, but, on the other hand, there may be limitations imposed by the number of digits available for coding classes and subclasses, particularly in a unit record system. Whatever the case, the property officer should be alerted to distinguish only significant differences.

Screening techniques cannot be accomplished effectively unless equipment can also be identified and located. It may also be useful to have the purchase date or model number in order to eliminate obsolete items when screening. It is essential to the process, therefore, that data be included to accomplish these objectives.

Budgeting

Certain relationships exist between enrollment increases, the size and type of research and public service programs, and the purchase of additional equipment. There is also a relationship between the current condition of the equipment and future purchases and, to some extent, between the year of purchase of equipment and its replacement. A strong correlation exists between the building program of an institution and the purchase of equipment. Such relationships vary for different types and sizes of institutions, but in forecasting budgets it is essential to develop some probable dollar expenditures from such relationships.

There are variables other than those already mentioned. Scientific equipment used in certain disciplines has a very high obsolescence rate. Such rates can be reflected in property records, if desired by the institution.

Thus, the current condition of equipment, year of purchase, department claiming the equipment, and original cost or value of the equipment are data helpful in budgeting. Year of purchase and department purchasing would allow a distribution of a department's purchases by years. This compared with student-credit production by years, the expansion of the institution, and other significant factors, would assist forecasting of equipment expenditures in future budgets.

Providing Insurance Information

Inventory data are often used as one of the determinates in providing adequate insurance coverage. When so used, the location and cost, or value, of the equipment must be known. Location should be expressed at least in terms of the building. Also, it is occasionally necessary to know the room in which the equipment is located. This is particularly important when buildings are partially destroyed or damaged.

In order to replace damaged equipment it is also helpful to have identifying and locating data available. If equipment in a particular group of rooms is involved, files can be searched by room number to establish property numbers of equipment destroyed. Class and subclass numbers could then indicate the type of damaged equipment to be replaced. Similarly, the value of equipment can be established.

Reporting Assets

Many schools are required to prepare annual statements of assets for their governing bodies. Property records should be able to supply such information if it is needed. Sometimes refinements in categorization structure are required for such reports. Assets, for example, may be grouped by teaching, research, administrative and supporting units, and auxiliary enterprises. If such is the case, provision must be made for gathering data in terms of such responsibility centers. The cost, or value, of equipment is essential to asset reporting and should, therefore, be part of the information maintained. Other items useful for asset reporting are year of purchase (for evaluating equipment), usable life, department owning equipment, and the title holder of equipment (Federal, state, etc.).

Repurchasing Information

Inventory records are sometimes used by purchasing officers for reordering equipment, and for ordering replacement parts and auxiliary equipment for items already on hand. Such use of the records implies a very adequate descriptive title and an audit trail back to the original purchasing document (unless, of course, the name of the vendor of the original equipment is made a part of the inventory records). If information in the inventory records is adequate, it becomes possible for departments to reorder equipment by merely stating the property number of the item to be duplicated. If an adequate description is available and the vendor can be determined, the purchase order can be easily written.

Summary List - Inventory Objectives and Data Requirements

The objectives of inventory systems are set forth below, together with the minimum data needed to accomplish them; also shown are optional items which permit a greater degree of refinement and accuracy. Just as the list of objectives is not all inclusive but represents typical applications, so the data list is not exhaustive. Schools with additional requirements should modify or supplement their data requirements accordingly.

Inventory Objective	Minimum Data	Optional Data
Identifying Equipment	1. Unique identification number 2. Descriptive title of equipment and/or group and class code	(1) Manufacturer or brand name (2) Model number (3) Serial number (4) Title holder (used to distinguish university owned equipment from equipment owned by other agencies or individuals)
Locating Equipment	1. Unique identification number 2. College or department number	(1) Building name or number (2) Room number (3) Campus (4) Area
Determining Responsibility	1. Unique identification number 2. Descriptive title of equipment and/or group and class code 3. Responsible individual or department	(1) Cost or value of the equipment (2) Year of purchase (3) Condition of the equipment

Screening for Equipment on Hand	1. Unique identification number 2. Responsible individual or department 3. Descriptive title of equipment and/or group and class code	(1) Manufacturer or brand name (2) Model number (3) Location (4) Purchase date (5) Title holder
Budgeting	1. Responsible individual or department 2. Descriptive title of equipment and/or group and class code 3. Cost or value 4. Year of purchase 5. Title holder	(1) Unique identification number (2) Condition of equipment (3) Source of purchasing funds (4) Quantity in group items
Insurance Information	1. Unique identification number 2. Descriptive title of equipment and/or group and class code 3. Building name or number 4. Item cost or value 5. Title holder	(1) Responsible individual or department (2) Room number (3) Manufacturer or brand name (4) Model number (5) Manufacturer's serial number (6) Condition of equipment (7) Year of purchase
Reports - Assets	1. Cost or value 2. Title holder	(1) Year of purchase (2) Usable life (3) Department or college

Repurchasing Information	1. Unique identification number 2. Descriptive title of equipment and/or group and class code 3. Purchase order or invoice number	(1) Vendor's name (2) Vendor's address (3) Cost or value (4) Year of purchase (5) Manufacturer or brand name (6) Model number

IV. Miscellaneous Methodologies

In addition to data requisite to accomplishing the objectives of the inventory, certain techniques have been developed over the years for handling special problems. These techniques, which can be found in most established systems, are discussed below.

Group Items

It is useful and time saving to create some entries in the property records that represent groups of identical items. Examples of property often classified in this manner are folding chairs and tables, dishes, silverware, tools (particularly sets of tools), and some laboratory equipment (especially in teaching laboratories where there is considerable duplication of items). However, restrictions upon grouping identical items may develop from other data requirements. For example, if the room or building is part of the location data, group items should be restricted to identical items in the same room or the same building. If the function of equipment is part of the property record, group items may have to be restricted to those identical items used for research, or those used for teaching, or those used for other functions. It would also be difficult to include a year of purchase for group items purchased over a period of years. Such matters must be taken into consideration when specifications for group items are considered. Records for group items should also carry the number of items in the group; otherwise, the entry is weakened for purposes of accountability, responsibility, and analysis of dollar value.

Marking Equipment

It was earlier stated that equipment should be assigned a unique number and that whenever possible this number should be affixed to the item in question. Obviously, not all equipment can be marked or tagged, and not all equipment can be marked or identified in the same manner.

Lenses and certain other glass equipment, delicate scales, and other specialized instruments are examples of equipment that cannot be marked. A property record should be created for such equipment, and a number assigned to it. A careful description of the property should be included in the records as an aid to locating it. It is also helpful to indicate in the record that the equipment cannot be marked.

Not all equipment can be marked by the same method. Heavy-duty equipment such as tractors, trucks, and heavy machinery should probably have large durable property numbers painted on them as well as stamped into the metal frame. Some metal equipment can be marked with an inexpensive vibrating tool. Some wooden items, particularly porous items, can best be marked with inks. The majority of equipment can be marked with a decal or adhesive tag. The common practice is to print the name of the school along with the property number.

If different colored tags or decals are used to differentiate institutionally owned equipment from that owned by other agencies, provision should be made for carrying this distinction to items that cannot be so marked. As indicated in a previous section, a prefix or suffix to the inventory number is usually the best solution to this problem.

Many property officers have found it helpful to standardize the placement of inventory numbers on equipment. Typewriters, for example, may be tagged always on the lower left-hand corner of the right side panel or in the center of the back panel. It is also well to remember that decals in plain sight often get peeled off easily. Three criteria should be kept in mind when selecting a standard marking place: easy access for the auditor; noninterference with the use of the equipment; and placement of the marking device where it cannot easily be removed or obliterated.

Institutionally Constructed Equipment

Some items, particularly those used in research, are constructed by the institution, using its own resources. Such items are sometimes included in the inventory records if the cost and usable life of the constructed piece are such that it can be classified as equipment. Frequently, however, such equipment is designed for one specific purpose and may not have a usable life beyond the duration of the project for which it is constructed. Inclusion of such items in an inventory is of doubtful value. Items which do have a useful life longer than the duration of the project and which can be considered part of the institution's assets should be included in the record.

Different schools use different methods for arriving at the cost of institutionally constructed equipment, but generally the cost of such items is determined by the value of the material used for its construction. Labor costs may or may not be considered as part of the cost of the constructed item, depending upon the policy in effect at the institution. For insurance purposes or for sale of the item, it is desirable to include both labor and materials as part of the cost. Care should be taken, if labor costs are included, that a duplication of the cost does not appear in salary prorations of cost studies.

The solution might be to carry both a cost and a value for such items, including materials in the cost and both labor and materials in the value. The former would be satisfactory for cost studies, the latter for insurance valuations and the like. It is desirable to indicate in property records if an item is institutionally constructed.

CHAPTER 13

THE ORGANIZATION OF INSTITUTIONAL DATA: SUPPLEMENTARY MATERIALS

I. General

The materials provided in this chapter supplement Chapter 8 as follows: Section II, "List of Institutional Activities," details the discussion in "Zone 5: Institutional Activities" (Chapter 8); and Section III, "Suggested Reports and Analyses," supplements the discussion of "Combinations of Data" (Chapter 8).

In detailing a list of institutional activities, one faces the problem of finding a set of categories and subdivisions that will accurately reflect the activities of the institution without overgeneralizing and without overfractionating the activities as, in reality, they occur. This problem will probably never be completely resolved to the satisfaction of faculty, administration, and outside agencies since each group sees activities from a different frame of reference. It is important, however, that approaches to measuring institutional activities be explored and that categories be developed for testing the validity of resource measurement. As mentioned in Chapter 8, the list of activities developed by the Project Group is intended to be comprehensive enough to cover most of the significant and measurable activities upon which institutional resources are usually expended.

The listing of "Suggested Reports and Analyses" in this chapter is far from complete in that the possible combinations of data represented by the zones of the Data Organization chart are very great. The listing is, therefore, selective. In the explanation of various reports and analyses, methodologies are often suggested, and it is hoped that these will be useful in helping institutions to generate reports which the organization of data makes possible.

II. List of Institutional Activities

To define the seven main categories of institutional activities, they will be described primarily in terms of their components. The main categories are divided into subcategories which, in turn, are divided into subheadings.

The various components are not necessarily classifications about which an institution may wish to collect data. A subheading may be so fine that the accessibility of data about it may preclude analysis, or the subheading may be so minor that the need for information about it may be limited. It may also happen that data about a subheading are not easy to isolate from other data. The components of some of the main categories, therefore, may or may not represent useful subdivisions for data analysis. They are included because they help describe what each of the main categories represents.

I. Instruction. This category includes resources expended on teaching connected with curricula of the institution. In general, it represents the formal instructional program of the institution as it is set forth by course offerings in catalogs or announcements. Included are all formal courses, regardless of whether they are lecture, laboratory, seminar, discussion, quiz, studio, or supervised study. Included are both degree and non-degree instruction and short courses, as well as special educational programs (including formal courses) conducted by continuing education divisions and agriculture and home economics extension divisions. Resources expended upon general informational programs (not disseminated through a formal course structure), conducted by such agencies as agriculture and home economics divisions, are reported under the appropriate heading in Public Services.

Excluded here are elementary and high school instruction conducted by institutions of higher education either as training schools for colleges of education or as a service for offspring of faculty and staff. Those resources expended on elementary or high school instruction for student training are reported under Training Schools (VII, A, 1). Only those resources expended upon degree credits earned by students of education in connection with such schools are included here.

A. Instruction Leading Toward a Degree or Certificate.

1. Terminal. This category includes resources devoted to terminal occupational curricula, usually leading to a certificate and designed primarily to prepare students for immediate employment in an occupation. Such programs usually extend not more than three years beyond high school. They are not designed as the equivalent of the first two or three years of liberal arts education or of preprofessional training, although credits earned may sometimes be applied toward an associate degree.

2. Subcollegiate Remedial Instruction. Included here are resources expended upon remedial courses not carrying degree credit. This category is included with degree credit rather than non-degree instruction because such subcollegiate remedial instruction is prerequisite to the degree. If this category is not maintained, it should be subsumed under Collegiate-Baccalaureate.

3. Collegiate-Baccalaureate. The heading represents resources applied toward associate or baccalaureate and

first professional degrees, including those non-technical or non-vocational programs at junior colleges leading toward associate degrees and transfer programs.

4. Graduate-Professional. Included here are resources applied to curricula leading to second-level professional, master's, and doctor's degrees. Resources devoted to thesis and dissertation are included even though they may not be assigned formal course numbers or credits.

5. Post-Doctoral. Resources devoted to formal education accomplished beyond the Ph.D. are included in this classification.

B. Non-Degree Instruction. Included here are those resources expended on special educational programs that do not lead to a recognized degree or certificate. Resources expended on classes, conferences, discussion groups, and educational services of an instructional nature are grouped here.

II. Teaching-Research. This heading includes resources devoted to teaching-research, defined as that kind of research activity which is carried on with one or more apprentice researchers for whom this research involvement is part of their formal educational program, and for whom, therefore, the principal investigator plays the role not only of research administrator but of preceptor as well.

III. Research and Development. Development is here included with research to provide maximum flexibility. Some institutions may not wish to make this separation between research and development.

A. Research. This category includes resources applied to research activity, whether it is organized research, departmental research, or contract research. Research is broadly defined as systematic intensive study directed toward the enlargement of the body of knowledge in a particular field. This definition includes scholarly research activity in the humanities and arts as well as in the sciences and professions.

1. Institutionally Supported Research. This subcategory includes resources applied toward research activity when the expense is borne by institutional funds. Included are both departmental research and organized research supported by the institution.

2. Sponsored Research. This category includes resources devoted to research accomplished with funds from sources outside the university, whether conducted by instructional departments or by special research divisions.

B. Development. Resources directed at the systematic use of knowledge for the design and production of useful prototypes, materials, devices, systems, methods, or processes fall under this heading. Subcategories of this heading, identical with those of Research, may be constructed if desired.

IV. Creative Activity in Art and Scholarship. This category contains resources devoted to the production of works of art - paintings, ceramics, poems, plays, novels, symphonies, and the like; the direction and presentation of plays, concerts, etc.; creative designing in architecture, tapestries, and the like.

V. Teaching Through Creative Activity in Art and Scholarship. This category is parallel to Teaching-Research and contains resources devoted to creative activity which is carried on with one or more apprentices for whom this involvement is part of their formal educational program and for whom, therefore, the principal artist plays the role not only of director and manager but of preceptor as well.

VI. Public Services. Included here are resources allocated to those activities and programs conducted primarily as services to the community, the state, and the public of the United States and other countries. Inclusion in this category depends upon the primary purpose of an activity. If the activity exists primarily as a public service, it belongs here. Resources devoted to off-campus instruction, sometimes referred to as "extension," are not reported here, but under Teaching. The category, Public Services, includes resources expended on such activities as follow.

A. Agricultural Services. Here should be assigned resources used for agricultural services to the community and state, guidance, informal instruction, the dissemination of information, and the demonstration of agricultural techniques and methods. The supervision of 4-H clubs, granges, and other such agricultural agencies are also included here.

B. Home Economics Services. In this category, resources assigned for home economics services to the community and state, including home demonstration, informal instruction, dissemination of information, and other such public services, should be allocated.

C. Veterinarian Services. Those resources devoted to veterinarian service to the community and the state, including informal instruction, dissemination of information, demonstrations, and other such public services, should be allocated to this category.

D. Urban Extension Services. Those resources of the institution expended upon assisting communities with urban planning or development are assigned here.

E. International Services. Those resources of the institution expended upon assisting foreign countries should be grouped here.

F. Cultural Programs. Resources used for lectures, speeches, artist series, films, concerts, and other cultural programs maintained for the public should be included here as well as resources devoted to art galleries and museums which are maintained primarily for the public. Those resources used for cultural programs maintained primarily for students should be allocated to Student Activities Services (VII, B, 8).

G. Radio and Television Services. This category includes resources expended for the presentation of programs via commercial as well as university radio, television, recording and cinema studios, if the purpose of the activity is to provide public entertainment and/or public education. Included are resources used for presenting all publicly broadcast programs other than degree instruction (except as indicated under VII, A, 3). Those programs designed for high school or elementary education should also be included here. Resources used for proprietary radio and television stations operated by the institution belong with Other General Institutional Services (VII, F, 17).

H. Ancillary Schools. Included here are resources devoted to high schools and elementary schools run for the benefit of the public. Institutions with religious control and some institutions in isolated communities occasionally maintain such services.

I. Conference and Public Meeting Administration. If there is an agency of the institution responsible for the conducting of conferences and public meetings, resources used for this activity should be reported here.

J. Public Health Service. Here should be reported those resources expended on the maintenance of public health exclusive of research and teaching.

K. Public Information Service. Gathered here are those resources devoted to providing information requested by the public.

L. Audio-Visual Public Services. Included are resources allotted to providing audio-visual equipment and materials to schools and the public.

M. School Services. Those resources devoted to teaching, counseling, consulting, and other activities performed as services to high schools and elementary schools should be allocated here. Also included are resources assigned to high school visitation, accreditation, and activities related to accreditation.

VII. Supporting Services. The following subcategories are typical of those activities maintained in support of the six preceding main categories. In general, schools will not wish to allocate resources to each of the subcategories and headings below. They are offered primarily as examples of those supporting activities found at institutions of higher education.

A. Educational Services. This subcategory includes resources directed toward institutional enterprises, organized and operated in conjunction with the instructional program and conducted primarily for the purpose of giving professional training to students or for providing educational services. Examples of such activities follow.

1. Training Schools. Included here are resources assigned to demonstration schools conducted for the purpose of student training in education. If elementary or high schools are operated primarily to educate dependents of faculty and staff rather than as a training device, they should be reported as Ancillary Schools (VII, C, 4); if for the public, as a public service, report under Ancillary Schools (VI, H).
2. Art Galleries and Museums. If these facilities are maintained primarily as aids to education or research, resources devoted to them should be included here; if they are maintained for the public, report under Cultural Programs (VI, F).
3. Educational Radio, Television, and Audio-visual Services. Included here are resources assigned to radio and television broadcasting maintained for instructional purposes. Included also are resources devoted to film libraries and other audio-visual services provided for the educational program of the institution.
4. Hospitals and Clinics. Here should be included the resources of the institution allocated to medical clinics and hospitals, dental clinics, and other such agencies maintained as training aids to educational programs. If feasible, those resources devoted to student health services should be separated from this category and allocated to Health Services (VII, B, 9).

B. Student Services. Gathered under this heading are measures of resources other than teaching which are performed primarily for the benefit of the student body. The following listings are examples of such activities.

1. Student Welfare. Included here are resources assigned to the non-academic counseling, maintenance of student discipline, supervision of fraternity and sorority programs, and student welfare generally, such as that usually provided by the offices of deans of students, deans of men, and deans of women.
2. Student Financial Aid Administration. Resources expended in the processing of loans, scholarships, fellowships, prizes, awards, and assistance should be included here. Resources devoted to student employment services and the administration of Federal and state aid programs to students, including the administration of student loans and fellowships, are included.
3. Organized Counseling and Guidance. Those resources assigned to guidance and counseling carried on within the structure of an organized guidance and counseling bureau or division should be reported here if such guidance and counseling is carried out primarily for the benefit of the student being tested.
4. Student Academic Record Keeping. Here are reported those resources devoted to the creation and maintenance of student record files, including permanent records and transcripts of such records, grade reports, class lists, matriculation indexes, and similar records. These func-

tions may be centralized in the office of the registrar or conducted at college, division, or departmental levels. Regardless of where the activity is carried on, resources expended on it should be gathered here.

5. Admissions. The material and effort directed toward the admission of students at all levels of progress should be included here. Evaluation of records and institutional testing programs for admission as well as the work of admissions committees and the recruitment of students are included. Time and material devoted to high school career programs and to traveling for the purpose of recruitment should be gathered here. However, if special personnel and facilities are devoted to the admission of and the evaluation of credentials for students of other nations, they should be reported under Special Services for Students of Other Nations.

6. Special Services for Students of Other Nations. Resources allocated to programs maintained solely for the orientation and benefit of students of other nations should be included here. Counseling and guidance, evaluation of credentials, admissions, and loan programs, all designed primarily for these students, fall into this category.

7. Placement Services. That activity and those facilities devoted to assisting students to obtain employment after graduation are included here. Employment services conducted to assist students financially during their period of matriculation are reported under Student Financial Aid Administration.

8. Student Activities Services. Recreational facilities, club rooms, reading rooms, music listening rooms, and other space devoted to student activities, as well as time spent by special offices in advising and assisting such activities, should be reported here. Included also should be resources expended on the institution's intramural program.

9. Health Services. Those resources expended on the maintenance of student health, such as clinics, infirmaries, nurses' offices, and psychiatric counselors, are reported here. The administration of student hospitalization insurance is also included. If student health functions are carried out by a university hospital and the measure of this activity is identifiable, it should be reported in this category.

10. Religious Services. Included here are resources devoted to organized religious activities and services. Chapels, chaplains, on-campus churches, administration and supervision of religious activities, religious counseling, and similar organized religious activity are included.

11. Housing. Those resources expended upon the creation, maintenance, operation, and procurement of housing for students, married or single, are gathered here. This includes dormitories, residence halls, and fraternity and sorority dwellings (if owned or leased by the institution), as well as married student housing. It also includes the procurement of off-campus housing for students.

12. Food Service. If dining facilities are maintained for

students, the resources used to provide this service are reported here.

13. Intercollegiate Athletics. The salaries of all personnel, the space allocated to the activity, and the equipment used in the conducting of all phases of the intercollegiate athletics programs are included here.

14. Other Student Services. Included here are resources expended on such enterprises as laundries, boat rentals, ski lodges, and the like, including the administration of special student programs such as Veterans' Affairs.

C. Personnel Services. In this category are gathered resources expended on special services for the faculty and staff.

1. Housing. Included here are resources expended for the creation, operation, procurement, administration, supervision, and maintenance of such facilities.

2. Food Service. If a special food service for faculty and staff exists, resources used to provide the service are reported here.

3. Faculty Club. If a club or lounge is maintained expressly for faculty and staff, institutional resources expended upon it should be reported here.

4. Ancillary Schools. Resources allocated to schools for the children or dependents of faculty and staff should be reported here.

D. Library Services. Resources devoted to library services, regardless of whether they are centralized or conducted at college or departmental levels, should be included here. A library service is here defined as the operation of a cataloged collection of material, with an organized system for locating or lending, maintained as a tool of instruction, study, research, and creative activity. This definition includes microfilm libraries, certain collections of artifacts, biological collections, music libraries, and the like. Cataloged materials presented primarily as exhibits for the public, as a public service, should be included under Cultural Programs (VI, F). Resources devoted to reading rooms and music listening rooms located in libraries should be included here.

E. General Administration. This heading covers those activities, facilities, and services maintained for, or in support of, the administration of the institution as a whole. Examples of such activities follow.

1. Executive Administration. Included are those institutional resources expended for administration of the institution by the following offices: the board of control, the chief executive officer, the vice presidents (or their equivalents), the dean of faculty, investment officers, planning and development officers, legal counsel, and other such offices.
2. College and Departmental Administration. Included are resources devoted to those activities carried out for the administration of colleges, schools, divisions, and departments within the institution.
3. Institutional Research. Included here are resources assigned for the operation of an office or department devoted to institutional research.

4. Budgeting. Here are allocated resources used toward the estimating of proposed expenditures, the consideration of proposed means of financing them, and the exercising of managerial control with the intent of keeping expenditures within limitations of available appropriations and revenues.

5. Accounting. Included here are resources devoted to the assembling, recording, and reporting of information concerning the financial operation and condition of the institution.

6. Finance. Those resources applied toward the custody, control, collection, disbursement, investment, and borrowing of funds are assembled here.

7. Auditing. Included here are resources applied to separately organized offices for audit control. Those resources devoted to the auditing function of business affairs officers should also be gathered here. Board of control auditing, if financed from institutional funds, should be placed with Executive Administration (VII, E, 1).

8. Fund Raising. Included here are resources devoted to offices maintained for the purpose of raising funds for the institution. If this activity is part of alumni services, it should be so reported (VII, E, 9).

9. Alumni Services. The resources applied to the maintenance of alumni records and the operation of an alumni office fit under this heading.

10. Hiring of Academic-Professional Personnel. If a special office is maintained for this purpose, its resources should

be included here. If identifiable and readily separable, the resources applied to the activities of administrative personnel, including deans and department heads, devoted to this function should be gathered here.

F. General Institutional. This heading includes those activities carried on in support of the institution as a whole which are not typically administrative activities.

1. Purchasing. Resources included here are those devoted to the buying of supplies, services, and equipment, and the local delivery of them.
2. Telephone Services. Resources expended upon telephone equipment, operators, and accommodations provided for central telephone services are included here.
3. Mail Services. This includes resources applied to postage and delivery of intra- as well as extra-university mail. Addressing services, however, are included under Printing Services (VII, F, 10). Included here should be resources expended upon personnel for delivery of mail and space allocated to this function.
4. Personnel Benefits. This includes resources devoted to the administration of and record keeping for retirement plans, hospitalization, insurance plans, and other similar benefits.
5. Information Services. This includes resources applied to the releasing of news to public media as well as the disseminating of general information about students and faculty to the public. Resources used for maintaining booths used to guide the public on campus should be included here

also.

6. Insurance. Resources applied on the administration of insurance for the protection of the institution fall into this category.

7. General Publications. Resources expended on general bulletins and catalogs, commencement programs, and other general institutional publications are included here.

8. Ceremonies. Those institutional resources allocated to commencements, baccalaureate programs, inaugurations, dedications, and other convocations and ceremonies are gathered here.

9. Civil Defense Services. Here are grouped resources expended for Civil Defense.

10. Printing Services. If a service exists for the printing of forms, form letters, tests, addressing service, and the like, resources devoted to it should be included here.

11. Parking. This includes resources applied to faculty, staff, student, and public parking services.

12. Food Services. Included here are resources expended upon cafeterias, dining halls, and catering services for faculty, staff, and students that cannot be allocated separately to Personnel Services (VII, C) or Student Services (VII, B).

13. Stores. This category holds resources used for maintaining a centralized distribution system for supplies kept in stock for use throughout the institution. It includes receiving, storage, and shipping of supplies.

14. Technical Services. Resources devoted to machine shops, photographic services, and the like, operated as central-

ized services to the institution, belong here.

15. Transportation Services. Included here are resources used for supplying cars, trucks, and buses used in common by the institution. Also included are airplanes and boats used primarily as transportation. Maintenance facilities as well as harbors and airports should be included.

16. Publication Services. Included in this division are resources applied to the university press, with its personnel and staff, maintained for the publication of scholarly works.

17. Other General Institutional Services. In this category are placed resources devoted to all general institutional enterprises not identified above. Bookstores, barber shops, drug stores, gift shops, beauty parlors, laundries, vending services, and the like are included here. Space leased to private concessions, as well as that devoted to institutionally owned enterprises, should be included. Commercial TV or radio stations owned by the institution belong in this classification.

G. Operations and Maintenance. Under this heading should be included all resources expended upon the operation and maintenance of the institution's plant.

1. General Operations and Maintenance. Included here are resources devoted to general supervision, utilities, custodial services, fire and police protection, watchmen, maintenance, and shops for carrying on maintenance, as well as grounds upkeep.

2. Engineering-Architectural Offices. Included here are re-

sources applied toward architectural offices, construction engineers, and personnel hired for the designing and supervision of institutional building programs.

3. Renovations, Alterations, and Improvements. This category includes resources devoted to improvements to existing buildings and to improvements other than buildings, such as tunnels, flagpoles, monuments, etc.

In creating the preceding list of activities, the accounting classifications set forth in College and University Business Administration, Vol. 1, were followed as closely as possible. Certain of the categories used in this reference represent a broad classification structure of activities. Responsibility centers are gathered under several main headings which correspond roughly to activity categories. For example, all teaching departments are listed under Instruction and Departmental Research. This heading appears to be one of convenience describing very broadly all activities of teaching departments. It is a category of convenience because most institutions do not employ, or may not choose to employ, a mechanism for separating teaching and departmental research, and teaching and contributory activities within the department. If the direct cost of instruction is needed, some attempt may be made to isolate that portion of the budget which is directly attributable to instruction as differentiated from that which is attributable to departmental research, departmental public services, or departmental supporting services. The point to be borne in mind here is that when data about instruction are to be combined with standard financial data about teaching departments the isolation of instructional expense becomes a problem because it is subsumed under a larger category.

Prior to World War II, the activities of a department were probably more nearly in line with budgetary categories than they are now. The amount of departmental research and public service probably represented a lower proportion of department budgets than it does currently, and hence the use of a broad category such as Instruction and Departmental Research presented less of a problem in analysis than is the case today. With a sharp increase of departmental research and public service activity, it becomes less useful as a category of activity measurement.

With the exception of Auxiliary Enterprises, the principal difference between the list of activities just presented and the conventional accounting classifications lies in a more detailed breakdown of several of the categories and some rearrangement of subcategories within main headings.

The category Auxiliary Enterprises was not used, because this term describes a method of operation more so than it does a group of activities. College and University Business Administration describes auxiliary enterprises as "income-producing enterprises operated primarily for service to students and staff and are intended to be financially self-supporting."[1] Since the emphasis is upon the mode of operation rather than upon the type of activity, this category was not used. Within a system of data collection, any activity that is income producing can be so designated, if an institution feels it desirable to analyze those resources devoted to auxiliary enterprises.

---

[1] Vol. 2, p. 55

III. Suggested Reports and Analyses

Some of the more useful reports and analyses that can result from the organization of data are described below. These are presented with the understanding that they represent but a fraction of the combinations and relationships possible.

Reports and Analyses from Student Data

Head-Counts of Enrollments

One of the commonest methods for measuring the size of the student body of an institution is to provide head-counts for particular units of the institution: by college or division, by year level (freshman, sophomore, etc.), by educational level (terminal, associate degree, bachelor's degree, etc.), by in-state or out-of-state, by on-campus or off-campus, and by home study. Head-counts may also be made by part-time and full-time, by student major, by degree sought, by credit and non-credit enrollments, and by degree and non-degree classification. Combinations of these classifications are useful in analyzing enrollments. Thus, a head-count of students by college and year level and by graduate and undergraduate reveals considerable about the relative sizes of programs within the school. Certainly, head-counts of new students by first time and by transfer (and year level of transfer) can be helpful in determining trends for future enrollments and, consequently, the probable future direction which the programs of the institution will take.

However, head-counts do not always make good indices for instructional resource allocation. Particularly, commuter institutions with heavy adult education and night programs would have difficulties in allocating instructional resources according to head-counts. One part-time student is simply not equal to one full-time student. If instructional resources are to be allocated on the basis of head-counts, some weighting of enrollment to compensate for varying loads is needed. One method for establishing such a weighting is to determine what percentage a full-time equivalent count is of a head-count in various colleges or divisions. Such a percentage, calculated over a number of years, allows an institution to determine the weight of its enrollment growth in various components of its programs. If the head-count of one college increases sharply, it is important to determine what portion of this is due to part-time and what portion to full-time enrollment increases.

There is another reason that head-counts do not always make good guides for instructional resource allocation. A student registered in one college or division may take all or part of his courses in departments under the administration of other colleges within the institution. An enrollment increase in a particular college may or may not therefore reflect an increased instructional load of that college or its departments.

It is particularly difficult to determine the resource needs of a service department from a count of majors in that department. Departments of English or mathematics may often have few majors but a very great number of students to instruct simply because they teach basic courses which are usually prerequisite to most if not all degree programs throughout the institution. Obviously head-counts of either the college enrollment or the majors within the department will not be representative of the actual teaching load of the department.

Credit Output Analyses of Enrollments[2]

Another approach to the measurement of enrollments, and one which is somewhat better weighted than a head-count, is an analysis of credit output of departments or colleges. The credit output of a course equals the enrollment of the course multiplied by the units or credits of that course. A course taught for three units with an enrollment of 50 students produces an output of 150 credits.

This approach to enrollment analysis somewhat overcomes the objections to head-counts stated earlier. Credit output represents more accurately the instructional load and faculty needs of colleges, divisions, and departments than do head-counts. It does not pose the problem of the part-time student since it is computed on the basis of single course registrations rather than on the basis of individuals who may have a number of course registrations.

Since the credit output of a department represents its total course enrollments, it can be much more effective for evaluating the instructional resource needs of a department than a count of majors. Also, a student credit count of a college represents all the course enrollments of departments within that college, regardless of the college to which a student is assigned for a degree program; therefore, it more accurately represents the instructional resource needs of the college.

It does not, however, reflect with complete fidelity instructional resource needs, because there is not always a one-to-one ratio between credit output and the demand for instructional resources. Put another way, one credit may or may not be equal to one period of meeting time in a classroom. Thus, a department with a straight lecture program may need only half the amount of space that a department with laboratory offerings may require for the same credit output.

---

[2] The conventional term "student credit hours" used to describe the product of enrollment multiplied by a credit of a course has been replaced here with the term "credit output" since there is not always a one-to-one ratio between credits and hours of class (or more specifically, period of class). The word "hours" would appear, therefore, to be a misnomer. (See also Chapter 5.)

Further, some departments are able to produce large amounts of credit output with a small number of teacher contact hours, whereas other departments cannot do this, because any one of a number of conditions impose limitations on class size. The nature of the instruction, the type of facility used in the instruction, and the educational level at which the instruction is conducted are typical of such limitations.

Analyses of credit output, therefore, while overcoming some of the objections to head-counts, still do not completely reflect the instructional resource needs of the department.

Finally, because of the difficulties of working with large numbers, it is sometimes useful to convert credit output to full-time equivalent students. It is also useful to make this conversion in order to relate credit output to something representative of student enrollments. The easiest and most common practice is to divide credit output by a constant which is roughly equal to what a full-time student carries as an average load. Nationally, the practice has been to use fifteen as a semester constant for undergraduates. Institutions with graduate and graduate-professional programs may find it desirable to use a lower constant for computing full-time equivalent graduate students since the average credit loads of graduates are usually lower than for undergraduates.

Student Contact Hour Analyses of Enrollments

At least one of the objections to credit output analyses can be avoided by analyzing course enrollments in terms of student contact hours, or, as they are sometimes called, student class hours. These are equal to the enrollment of the course multiplied by the number of periods the class is in session. If a lecture-laboratory course involving one hundred students meets for three hours of lecture and six hours of laboratory for a total of five units, the student contact hours would equal 900 (nine contact hours times the enrollment), whereas credit output would equal 500 (five units times the enrollment). Student contact hours, therefore, are more expressive of the number of room periods used, the student stations occupied, and the square feet needed to conduct the course than is credit output.

Student contact hours also express better the number of teaching hours required to conduct the course and hence, all other factors being equal, express better the instructional manpower resources needed. That is to say, the nine contact hours per student express the number of teacher contact hours better than do the five credits, providing, of course, that no more than one teacher and no more than one laboratory section is involved in the calculation.

Just as credit output can be reduced to full-time equivalent students, so student contact hours, when divided by a constant, can also be reduced to full-time equivalent student loads. The constant can be calculated by arriving at the average student contact hours per full-time student. However, it should be sufficient for most needs to express for each department a ratio between credit output and student contact hours.

Distributions of Student Enrollment Measurements

Each of the three preceding approaches to measuring enrollments can be examined in a number of different ways. Such data can be stratified according to the classification shown in Zone 3 of the Data Organization chart - by system, university, college, division, department, or discipline. They can further be examined according to such student data categories as on-campus (or resident) instruction, off-campus (or extension) instruction, or home study. Other distributions might be by segment of education (junior college, college, professional school, graduate school, vocational school, adult education, etc.), by major, by degree objective, by educational level, or by year level.

Student Body Profiles

Since measures of secondary school success and ability test scores are available in student data, profiles of the student body can be constructed according to college, year level, sex, geographic area, and according to whether a student is first time, transfer, continuing, or readmitted. Further, these data can be used to establish correlations between high school success, ability test scores, and college success as reflected by college grades or the awarding of a degree. Such studies and comparisons can be helpful in establishing admission standards, in verifying the validity of ability test measures, or in evaluating grading practices at the high school or the college level.

Student Grade Average Distributions

Inasmuch as grades and units are available for every course carried by a student, individual grade averages can be calculated and, consequently, group averages by year level, by colleges, by dormitories, and by fraternities and sororities can be obtained. Rankings by grade average can also be produced for various purposes. Probation or warning lists and scholastic honor lists can be turned out for deans of colleges or divisions. Certification of graduating seniors for the number of units accomplished and grade average maintained can become part of the output. The administration of scholarships, fellowships, and loans can be helped by availability of lists of scholarship, fellowship and loan holders with semester and cumulative averages and units thereon.

Enrollment Projections

Projections of head-counts, full-time equivalent students, and full-time equivalent contact hours can be developed. Student credit trends for colleges and departments can be assembled for a number of years. Such trends provide a basis for the allocation of predicted university enrollments to departments and colleges within an institution and thereby make excellent data for long-range planning of resource allocations at departmental levels.

Operating Reports from Student Data

A number of operating reports can result from student data. Several of them are described below.

1. Grade Reports. Since course data, including title credit values, grades awarded, and the department offering the course, are maintained for each student, a listing of courses by individual students can be accomplished. Additional information such as cumulative and semester averages, cumulative and semester units attained, year level of the student, college or division, major, and home address (for mailing purposes) can be added. Most schools prepare such reports routinely at the end of each grading period and distribute them to students and administrative offices as a by-product of their data system.

2. Permanent Student Records. Permanent student record data, maintained on computer tape or on a posted ledger, can be assembled from stu-

dent data. Generally much of the same information contained on the grade report is repeated on the permanent record. Some permanent records carry measures of secondary school success, ability test scores, institutions previously attended, and previous degrees or certificates.

3. Student Directory. Since student name, official domicile, and local address are part of the information maintained about students, compilation of a student directory is possible. College, year level, marital status, telephone number, and other such information may be also useful. The early availability of such a directory removes considerable pressure from student information files. Many institutions are now routinely preparing such directories by computer or tabulating equipment.

4. Other Operating Reports. Matriculation indices, student lists, class rosters, grade lists, enrollment reports, and the like can also be developed from the student data recommended in this report.

Reports and Analyses from Manpower Data

Head-Counts of Faculty

A head-count is one of several approaches to measuring faculty or staff at an institution; it is useful since some institutional resources are customarily allocated in such terms. Office space and parking space needs, for example, are probably best calculated in terms of head-counts.

Distributions of head-counts can be made by college, by department or division, by sex, by rank, by date of birth (this distribution makes a good predictor of faculty loss through retirement), by date of appointment, by highest degree and by instructional source of highest degree, by salary and by source of salary, by appointment type, by senate voting status, by tenure, by language proficiency, by honors received, and by many other criteria. For example, it may be desirable to distribute faculty by departments within college and by sex within rank, or by senate voting and non-voting status within rank.

Full-Time Equivalent Faculty Measures

For some purposes, the full-time equivalent faculty count makes a much better measure than a head-count. Certainly a ratio of students to faculty or a study of teaching costs should deal with full-time equivalents in teaching rather than a head-count.

For methods of computing the full-time equivalents of part-time personnel, see Chapter 4 and Chapter 10 (Section IV). Some of these methods can be adapted to obtaining full-time equivalent teaching faculty.

Teaching Load Analyses

Useful reports can be developed from manpower data concerning the activity of teaching. Some of these are described below.

1. Analyses of Student Credit Production. From course enrollments present in manpower data, or through a combination of manpower and student data, it is possible to distribute student credits in a number of different ways as they apply to teaching personnel. Distributions can be made according to rank, by departments or divisions, by colleges, and by full-time equivalent faculty. Further, distributions of student credits among faculty can be made in terms of the level of the course offered or, when combined with student data, by the year level of the student. Thus, it becomes possible to determine what proportion of the lower division, upper division, or graduate student credit output of a department or a college is taught by professors, by associate or assistant professors, or by instructors or lecturers. It is also possible to ascertain what proportion of different levels is taught

by full-time or part-time faculty.

2. Analyses of Teacher Contact Hours. Teacher contact hours can be looked upon as representing a measure of input to the activity of teaching. By using the concept of input-output with regard to teaching activity, some interesting analyses can be developed. It should be pointed out, however, that such indices should be handled cautiously and only by individuals who are completely familiar with the wide range of variables that affect such measurements. Thus, if a high ratio of output to input were taken as a criterion of excellence, departments with heavy graduate programs would often rate low on a scale. Similarly, departments offering courses requiring a large number of teacher contact hours to produce student credits (as with departments having laboratory offerings) would rate low on an input-output index. When used carefully, such ratios can provide knowledgeable administrators with some good analyses of resource allocation and expenditure. Perhaps the most useful result of input-output ratios is the development of trends over a number of years. A department head can deduce from such trends the possible effect that additional teaching personnel will have upon the input-output ratio of his department.

It is also helpful in the analysis of programs to distribute teacher contact hours by rank, department, college, by sex, by highest degree, by appointment type, by types of instruction, by level of instruction, and in similar ways. Analyses of teacher contact hours are helpful in estimating the number of new faculty required for a projected student enrollment.

3. Analyses of Percentages of Time or Effort Devoted to Teaching. Also useful are distributions of faculty time or effort by level and type of instruction. With such information, department heads and deans

can more effectively analyze their departmental programs and anticipate needs for additional faculty.

The time or effort devoted to a particular type of instruction (lecture, laboratory, seminar, etc.) may have strong bearing upon staffing plans for a department. Here again, however, there are variables that should be recognized. A new course may take considerably more of a teacher's time than one which has been presented over a number of years; an upper division course may require more time or effort than a lower division course. The direction of theses or dissertations may require irregular expenditures of time or effort.

Studies of Teaching Costs

Since the salaries of faculty and percentages of time or effort devoted to teaching are available, dollar measurements for certain units can be determined. Costs per teacher hour expended and per student credit produced are possible. With such data, enrollment projections or anticipated new programs can be converted to dollars required for teaching salaries. These, combined with other dollar measurements, can produce financial forecasts. Refinements can be introduced to measure teaching cost in terms of types of instruction, levels of instruction, and by ranks of faculty. Trends of such costs can also be useful.

Projections of Teaching Faculty

With input-output data in the form of teaching hours and student credits for departments and for different types and levels of instruction, projections of faculty requirements can be developed from student credit projections. If the average teaching hours required to produce a given number of student credits in some subject field are known from past data, the probable teaching hours required to produce some future number of student credits in that field can be calculated. (Allowance should be made for increases or decreases in the average according to whatever future policy is seen to be.) If desired, teaching hours can then be translated to teaching staff, to teaching ranks, and to dollar needs.

Distributions of Faculty Effort

A valuable report can be constructed by creating a distribution of faculty percentages of effort or time among the major activities shown in Chapter 3. Deans and department heads can then determine the deployment of their department or college effort and examine any imbalances that may exist.

Salary Studies

Ranges and means of faculty salaries by rank, by college, or department, and by sex, can be developed from manpower data. Salaries can also be distributed in terms of length of employment and by the source of the salary. Activities information and salary information can be combined to show the mean salaries of faculty of a certain rank who devote more than half of their time or effort to teaching as contrasted, for example, with those devoting a comparable amount to research or public service.

Reports and Analyses from Facilities Data

Useful analyses resulting from facilities data have been covered in other chapters of this report. For those that can result from building space inventory data and room utilization data, see the first half of Chapter 6 and all of Chapter 11. Likewise, for those that can result from data on equipment, see the last half of Chapter 6 and all of Chapter 12.

Distributions and Analyses from Combinations of Data

Useful reports and analyses can also be developed from combinations of student, manpower, and facilities data. Since all such combinations cannot be discussed here, a sample of the more apparent ones are listed.

Faculty-Student Ratios

A faculty-student ratio is essentially a ratio of input (whether it be in the form of a count of full-time equivalent faculty or teaching hours) to output (whether this be full-time equivalent students, credit output, or student contact hours). A ratio of a teaching faculty head-count to a student head-count will not accurately reflect the fact that some teaching faculty may be part-time and some students may be part-time.

For example, when using a count of full-time equivalent faculty as input and a count of full-time equivalent students as output, ratios can be calculated for departments, for colleges, and for the institution as a whole. They should also be calculated for different levels of instruction since ratios of full-time equivalent teaching faculty to full-time equivalent students vary greatly among lower division, upper division, and graduate programs. Trends of such ratios over a number of years are particularly useful as partial guides to the adequate staffing of teaching departments.

Analyses of Space in Terms of Enrollments and Faculty

From facilities data and enrollment data, it is possible to calculate the number of square feet available for each full-time equivalent student in various types of space. It is also possible to distribute space according to the activities performed within the space and to calculate these distributions in terms of square feet per full-time equivalent student.

Of value in planning future buildings, for example, is the ability to anticipate the amount of square feet of classroom and laboratory space needed for future enrollments, the amount of food service space to allow, the number of dormitories to construct, and the space required for certain student activities. Similarly, it is desirable to know what portion of a building program should be devoted to teaching, to research, to supporting services, and the like.

Much the same technique can be used to calculate the number of square feet of different types of space required for faculty offices, faculty housing, food service space, and certain types of research space. With the square feet of such space per faculty member available, future requirements for this type of square footage can be better anticipated.

In projecting space requirements based on square feet per full-time equivalent student and upon square feet per faculty member certain considerations should be made. It should be borne in mind that all space needs do not increase proportionately to enrollment or faculty increases. Further, generally, square feet per student requirements in certain types of space tend to decrease with increases in the student body. Another consideration that should not be neglected in space projections is that existing space may be inadequate for the current enrollment. A projection in terms of such a status quo would hardly provide adequate facilities for future enrollments.

Other Combinations of Data

Many other combinations of data are possible, as suggested by the following examples: the number of full-time equivalent faculty per degree awarded, the number of full-time equivalent students per degree awarded, the square foot area per degree awarded, the square foot area

per total individuals employed, the number of courses offered per full-time equivalent student or per degree awarded, the number of student credits finally terminating in a degree as opposed to those not terminating in a degree.

CHAPTER 14

TOTAL INFORMATION SYSTEMS FOR COLLEGES AND UNIVERSITIES: SUPPLEMENTARY MATERIALS

I. General

The materials in Section II of this chapter supplement "Developing Major Systems of Data," discussed in Chapter 9. These materials describe the basic data files that support each of the major systems. As indicated in Chapter 9, the major systems of data are Manpower, Students, Facilities, Finances, and Activities.

Section III of this chapter, "Outline for an Information System for University Management," indicates some of the questions answerable by such a system, together with suggested categories of information and related items, all of which may be helpful as a starting point in developing the framework of a total information system in a college or university.

II. Basic Data Files

Manpower Files

The five basic files for Manpower are (1) Current Personal Data, (2) Payroll and Deduction Records, (3) Historical Data, (4) Time Assignment Data, and (5) Manpower Control Data. Each of these files contains the identification of individuals in order to establish connecting links that will provide for interrelating and cross referencing all data on individuals throughout the total information system. Social security number and name are suggested as the data elements for this identification.

The Current Personal Data file provides current status data relating to residence, marital status, dependents, current payroll deductions, departmental assignments, office address, etc. This type of data should be in a separate file because it will be needed frequently and must be current with each use. For example, the items of personal data required for the processing of a payroll may be needed as often as once a week.

By placing frequently used data in a separate file the updating can be simple, fast, and controlled. In addition to recording data in data processing storage media, the frequently used data can be printed on a ledger-type document that can be updated by using a semi-automatic machine that is capable of placing the alteration on the face of the document and producing simultaneously a punched card or paper tape that can be used to update the master tape or card file. The object here is to keep the data visible, ready for immediate visual reference, and the master tape or card file in perfect parallel at all times.

The Payroll and Deduction Records file provides a history of all salary and wage payments and all payroll deductions. In all cases, this file should indicate the source of pay, the amounts of pay, the payroll deduction codes prompting the deductions, and the deducted amounts, by periods. Recording both a code that prompted action and the resulting action, provides an audit trail of occurrences concerning an individual and, in addition, a record that will provide control of the processing itself. This information would include what is usually called "Year-to-Date Earnings Data."

This file would result entirely from the processing of payroll and/or payroll corrections. Consequently, all changes to the file should be items previously produced. Programming for this fact can provide control of the file.

The Historical Data file provides all data concerning heritage and a complete history of past activities. It can include data concerning physical characteristics, security clearances, a history of committee assignments, education, etc. When recording work experience and education, the data should include inclusive dates and codes that indicate the type of work or schooling and the locations at which they occurred.

The Time Assignment Data file provides detailed data concerning current assignments. No level of detail is recommended here. However, it is suggested that it should include current committee assignments and outside activities.

The purpose of this file is not to keep a record of all activities in which a faculty member is engaged. These data are more properly kept in the activities files. The Time Assignment is a record of the formal commitments for the faculty member. It will provide also the most direct functional tie to the budget allocation of salary funds.

The Manpower Control Data file will carry all the necessary data for routine manpower decisions. Criteria which determine tenure, for example, would be part of these data. Any limitations on payroll deductions or fringe benefits would be carried as control data within this file. Its primary purpose would be for facilitating the routine examination of manpower eligible for or requiring changes in status, fringe benefits, deductions, awards, and similar matters.

Data concerning the entire population associated with a university will not necessarily be carried in each of the Manpower Basic Data files outlined above. For example, the Time Assignment Data file probably would provide data concerning all budget or salary personnel, but not wage personnel. The Historical Data file would provide data on all personnel, both salary and wage. The Current Personal Data file and the

Payroll and Deduction Records file would include data on salary personnel, wage personnel and retired personnel. The need for data concerning retired personnel is based on the fact that retirement benefits normally include continued coverage on insurance programs, etc., and these data would be needed to control reporting.

Student Files

The major system of Students contains, as a minimum, seven basic data files. They are Admission Records, Student Personal Data, Non-Academic Records, Academic Records, Housing Data, Alumni Records, and Academic Control. These files could be supplemented by others depending upon the definition of their contents. Student Personal Data could cover the current year for each student or the entire span of his student life. If the former, then a Historical File would be necessary. The file maintenance problem is a little different than with faculty because of the data collection differences and the shorter time span for student residence.

The Academic Control file would contain not only the data relative to requirements for graduation and course prerequisites, but also control data for scholarships, awards, society membership, and student participation in extra-curricular activities.

As in the manpower system, the division of student data into files is based on several criteria. The design criteria are:

1. Data with the same point of origin and frequency of use are grouped together.
2. Each file contains a connecting link in order to provide for cross referencing the data throughout the total information system. The connecting link sug-

gested is the same as that in Manpower, i.e., social security number and student name.

3. Data with a high frequency of use are recorded both in data processing storage media and on a ledger-type document that will provide for altering the face of the document and producing simultaneously a punched card or paper tape that can be used to update the master tape or card file.

Facilities Files

The major system of Facilities contains a minimum of six basic files. They are Land and Buildings Inventory, Rooms and Facilities Inventory, Special Laboratories Data, Equipment Inventory, Expendable Items Inventory, and Maintenance Control Data. The Fallout Shelter Data file is suggested as a supplement to the six basic files. Maintenance Control Data is not a commonly encountered file. By adding these data and relating them to inventory, a complete new area of management information can be provided. There is no separate facility assignment file because assignments are part of the Inventory file.

These data file names are self-explanatory except for the Special Laboratories Data file. It will provide data pertaining to unique assemblages of space and equipment. The purpose of this file is to provide both a current and historical record of assemblages, usually with an identifiable name such as laboratory or center, which may or may not be a budgetary or activity unit. Such special laboratories provide a facility capability which is not recorded through the simple recording of facility or equipment inventories.

Finance Files

In the major system of Finance there are ten basic files. Three files are in the area of budgets: Budget Data, Income Data, and Expense Data. Four files will support an accounting system, i.e., Budget Allotment, Payment Data, Encumbrance Data, and Payroll Charges and Credits. The other files are Accounts Receivable, Accounts Payable, and Student Loans. The individual purposes of these files are evident from their names.

Activities Files

The files in the major system of Activities will be of prime importance in the development of total information systems. As stated earlier, the goal-oriented programs are the dominant part of an information system for education. It is in this region that effectiveness will probably be measured ultimately.

The major system of Activities contains ten files in six categories. The area of Instruction has two files, Current Instructional Contact and Past Instructional Contact. It will be noted that the Student System did not contain a file for current enrollment; these data appear in the Current Instructional Contact file.

In the area of Research, there are two files, Research Data and Publications Data. This might readily be expanded to contain other files. In the area of Public Service, there are three files, one in Extension Activities, one labeled Conferences and Short Courses, and one called Adult Education.

The fourth category contains one file of data relating to Student Activities, but division into several probably will be needed. The fifth category is control data and the only file suggested is Curricula Control

Data. Control data files will contain data that set out the decision rules needed in an everyday operation and also in computer programs. A similar file may be needed in each activity area, e.g., for adult education, for conferences, for publications, etc. This matter can be settled only after experience.

A sixth category contains a file for Projected Programs. This could be an entire series of files depending upon the information generated. The intent is to portray the activity and records that go into planning of buildings, research proposals, new curricula, and similar combinations of facilities and people to satisfy need.

Summary

In the total systems concept, the basic data files are related to the resources and activities and are not the possession of a functional unit as is normally the case. Student data, in the application of the total systems concept, do not belong to the Office of the Registrar, but rather to the total information system. The collection and maintenance of most data in basic files will be a part of some particular operation, such as registration; however, the data belong to the whole. However, in the operation of a total information system, each functional unit, even though it will not maintain possession of data, will have a responsibility to collect and furnish data for use throughout the entire system.

III. Outline for an Information System for University Management

A. Types of Questions That Will be Answered with an Information System

1. The status of institutional resources at any one time

2. The allocation of resources to institutional purposes

   a. Undergraduate instruction
   b. Graduate instruction
   c. Research and scholarly inquiry
   d. Public service and extension

3. The allocation of resources to particular segments of the university community

   a. Student segment
   b. Faculty segment
   c. Non-academic segment

4. The allocation of resources to particular academic programs

   a. Agriculture
   b. Engineering
   c. Science
   d. Humanities
   e. Other

5. The allocation of resources to various elements of cost

   a. People
   b. Facilities
   c. Administration
   d. Expendable operations
   e. Public information
   f. Educational service
   g. Other

6. The allocation of resources to various public or institutional problems

   a. Transportation
   b. Water resources
   c. Space exploration
   d. Other

7. The parameters that characterize the institution

   a. Quality level of students
   b. Geographical locale served
   c. Retention of students
   d. Source of resources
   e. Types of programs offered
   f. Quality of staff
   g. Quality of facilities

   - h. Economic level of students
   - i. Size of the institution and its physical plant
   - j. Type of institutional organization

8. The scope and character of the educational program

   - a. Academic level of the programs
   - b. The departments and majors
   - c. Types of curricula
   - d. Relationships between faculty and program
   - e. Relationships between departments and degree
   - f. Relationships between curricula and courses
   - g. Relationships between research and instruction
   - h. Relationships between programs and public service
   - i. Relationships between majors and minors
   - j. Relationships between students and programs
   - k. Relationships between students and faculty
   - l. Interdisciplinary activities
   - m. National and international involvement
   - n. Scope and nature of research

9. The characteristics of institutional operations

   - a. Utilization of space
   - b. Faculty loads
   - c. Services required per faculty member
   - d. Facilities required in relationship to program
   - e. Participation of faculty in off-campus activities
   - f. Travel and inter-university communication

10. The output of the institution

   - a. Publications
   - b. Research reports
   - c. Conferences, seminars, and public gatherings
   - d. Student performance
   - e. Faculty used as industry and government consultants

B. Functions of the Educational Institution for Which Information Is Needed

1. Discovery and processing of knowledge

2. Organization and display of knowledge

3. Identification of intellectual talent

4. Guidance and counseling of talent

5. Programming of information for intellectual development

6. Programming of information for vocational and skill development

7. Provision of educational advice and counsel to the community at large

C. Basic Elements of Education on Which Information Is Needed

1. Students
2. Faculty
3. Facilities
4. Program
5. Administrative leadership
6. Academic atmosphere
7. Community support and back-up

D. Classes of Information Required

1. Historical information
2. Inventory information (current status)
3. Direction of movement and rate of movement
4. Potential

E. Types of Activities on Which Information Is Desired

1. Activities to which faculty members may devote time

    a. Classroom and laboratory instruction
    b. Advising and counseling
    c. Examination and grading
    d. Preparation of course and curriculum material
    e. Research and scholarly inquiry
    f. Design and improvement of facilities
    g. Committee work (internal)
    h. Administration of other staff members
    i. Conferences, seminars, and similar public services
    j. Advice to public and civic agencies
    k. Professional activity
    l. Recruiting and advice to employers
    m. Individual student tutoring, supervision, or instruction

2. Activities in which students engage

    a. Classroom attendance
    b. Conference with faculty
    c. Counseling and guidance
    d. Testing
    e. Programming course sequences
    f. Library inquiry and reading
    g. Conferences and meetings with other students
    h. Lectures, etc., aside from classroom and curricula sequence
    i. Research participation

    - j. Homework and report preparation
    - k. Recreation
    - l. Social activity

F. Possible Groupings of Information (Sub-systems)

1. Personnel files

    - a. Vital data file
    - b. Experience data file
    - c. Cultural and educational data file
    - d. Payroll file
    - e. Current activity data file

2. Facility files

    - a. Space inventory file
    - b. Equipment inventory file
    - c. Space use file
    - d. Campus grounds file

3. Student files

    - a. Student records file
    - b. Vital data file
    - c. Enrollment file
    - d. Student activity data file

4. Resource acquisition files

    - a. Appropriation file
    - b. Industry income file
    - c. Federal government income file
    - d. Other income file

5. Expenditure files

    - a. Payroll file
    - b. Travel file
    - c. Communications file
    - d. Other accounting files

6. Program and activity files

    - a. Course and curriculum file
    - b. Research project and program file
    - c. Short course and conference file
    - d. Extension activity file
    - e. Graduate student supervision file
    - f. Institutional service activity file
    - g. Student service file
    - h. Faculty service file
    - i. Public service file
    - j. Athletic program file
    - k. Facility services file

G. **Possible Unit Programs to Be Identified by Numbers (Coded)**

1. Courses (types)
2. Curricula
3. Research projects (types)
4. Research programs
5. Conferences and seminars
6. Non-credit courses
7. Public contacts
8. Public programs
9. Institutional committees and councils
10. Subject areas and disciplines
11. Student organizations
12. Faculty organizations
13. Administrative units
14. Advisory organizations
15. Faculty service organizations
16. Athletic programs
17. Student service organizations (or programs)
18. Publications

H. **Possible Detail of Activities of Individual Faculty and Staff**

1. Courses
    a. Design or programming
    b. Classroom instruction
    c. Preparing for classroom appearance
    d. Examinations (Grading)
    e. Preparing instructional aids and materials
    f. Consulting with individual students
    g. Supervising
    h. Scheduling for
    i. Issuing information on
2. Curricula
    a. Design or programming

    b. Supervising scheduling for
    c. Admission of students to
    d. Advising and counseling
    e. Issuing information on

3. Research projects

4. Other

PART III

APPENDICES

APPENDIX A

LIST OF PARTICIPANTS

Institutional affiliation and position were current as of the time of the completion of the initial report in 1965. Individuals who were not associated with the Project for the entire period of the study or for a significant portion thereof are indicated with an asterisk. Individuals who were invited guests at plenary meetings are indicated with two asterisks.)

University of Arizona

Carr, Sherwood E.	Assistant Comptroller
Grant, Arthur T.	Educational Research Analyst
Murphy, Kenneth R. *	Comptroller
Patrick, David *	Coordinator of Research
Shaw, James R.	Associate Coordinator of Research

University of Florida

Elmore, William E.	Associate Business Manager
Greene, Calvin C.	Director, Physical Plant
Jennings, Robert B.	Director, Academic Services
Johnson, R. S.	Registrar
Jones, W. Ellis	Business Manager
Kopp, Edgar W. *	former Assistant Dean of Academic Affairs

Michigan State University

Dahnke, Harold	Director, Space Utilization
Martin, Frank *	Director, Data Processing
Saupe, Joe L.	Assistant Director, Office of Institutional Research
Tucker, Allan	former Assistant Dean for Advanced Graduate Studies and Assistant to Vice-President for Research

University of Pennsylvania

Bohosiewicz, Gregory	Auditor
Burns, Lillian G. *	Associate Planning Coordinator
Goddard, David R.	Provost
Hess, Jr., Arleigh P.	Vice Provost
Korostoff, Edward	Senior Research Investigator
Malone, James L.	Contracts Administrator
Morgan, F. Haydn *	former Director, Project Research and Grants

University of Pennsylvania (Continued)

Murdock, William J.	Assistant Comptroller
Murray, Donald S.	Assistant to the President

Rensselaer Polytechnic Institute

Allen, Edwin Brown	Professor and Dean of the Graduate School Emeritus
Boothby, Lawrence W.	formerly with the Office of Institutional Research
Bowen, John H. *	formerly with the Office of Institutional Research
Daniel, Clarence H.	Business Manager
Dohrenwend, Clayton O.	Vice President and Provost
Dunlop, John A.	Registrar
Finch, Rogers B. *	Associate Dean, Hartford Graduate Center, Rensselaer Polytechnic Institute of Connecticut, Inc.
Hartigan, Raymond H. *	Director, Research Division
Hollingsworth, Jack W. *	Professor of Mathematics and Supervisor, Computer Laboratory
Plant, Kenneth J. *	Comptroller
Tyrrell, Philip H.	Director, Office of Institutional Research
Wilmot, Edward J. *	Coordinator of Student Services

Saint Louis University

Henle, S.J., Rev. R. J.	Academic Vice President and University Research Administrator
Marino, Charles J. *	Personnel Director
Podnar, Violet *	former Research Assistant
Richart, Robert H. *	Instructor, Department of Hospital Administration
Wendt, Norman L. *	former Controller
Wessler, Richard	Research Associate
Wuller, Margaret *	former Registrar

Texas A & M University System

Anderson, R. L. *	former Comptroller
Calhoun, Jr., John C.	Vice Chancellor for Programs
Freeman, W. Clyde	Vice Chancellor for Fiscal Affairs
Graff, W. J. *	Dean of Instruction
Morrison, Don F.	former Assistant Research Mathematician
Price, Alvin A. *	Dean of Veterinary Medicine
Smith, B. L. *	former Director, Data Processing, Arlington State College
Smith, Robert L.	Director, Data Processing

Texas A & M University System (Continued)

Street, Robert L. *	Instructor, Industrial Engineering Department
Woolf, J. R. *	President, Arlington State College

University of Washington

Conrad, Ernest M. *	Vice President for Business and Finance
French, Wendell L.	College of Business Administration
Guild, Robert *	Coordinator, Institutional and Educational Research
Koski, Robert W.	Planning Officer
Thieme, Frederick P.	Vice President
Waldo, Robert G.	Director, University Relations and Development

National Institutes of Health

Dingle, Richard S.	Resources Analysis Branch, Office of Program Planning
Petersen, Richard J.	former Manpower Specialist, Resources Analysis Branch, Office of Program Planning
Rosenberg, Herbert H.	Chief, Resources Analysis Branch, Office of Program Planning

National Science Foundation

Colantuoni, Ido E.	former Staff Associate, Government-University Relationships Staff, Office of Economic and Manpower Studies
Klingsberg, Mrs. Vera	Professional Associate, Government-University Relationships Staff, Office of Economic and Manpower Studies
Levine, Oscar H.	Senior Staff Associate, Government-University Relationships Staff, Office of Economic and Manpower Studies
Perlman, Jacob	Head, Office of Economic and Manpower Studies

United States Office of Education

Conrad, Herbert S. **	Program Development Officer, Educational Research and Development

National Federation of College and University Business Officers Association

Wahlstrom, Nelson **	Executive Director, Committee on Government Relations

Tulane University

Scheps, Clarence **	Vice-President and Comptroller

APPENDIX B

REFERENCES

General

Barber, Bernard. "Some Problems in the Sociology of the Professions," *Daedalus*, 92: 669-688, 1963.

Brumbaugh, A. J. *Research Designed to Improve Institutions of Higher Learning*. Washington, D.C.: American Council on Education, 1960.

Groves, Harold M. *Education and Economic Growth*. Washington, D.C.: Committee on Educational Finance, National Education Association, 1961.

Horn, Francis H. "A University President Looks at Institutional Research," *The Role of Institutional Research in Planning*, L. J. Lins, ed. Madison, Wis.: The University of Wisconsin, 1963.

National Committee on the Preparation of a Manual on College and University Business Administration. *College and University Business Administration*, Vols. I and II. Washington, D.C.: American Council on Education, 1952 (Vol. I), 1955 (Vol. II).

Rourke, F. E. and G. E. Brooks. "The 'Managerial Revolution' in Higher Education," *Administrative Science Quarterly*, 9: 154-181, 1964.

U. S. Department of Health, Education, and Welfare, Office of Education. *A Proposal for a National Cooperative Survey of Education*. October 14, 1960. (Manuscript)

Watts, Charles H. "The Professional and the Professor," *The Educational Record*, 45: 285-290, 1964.

Academic/Academic-Professional Personnel

Axt, Richard G. and Hall T. Sprague, eds. *College Self Study: Lectures on Institutional Research*. Boulder, Colorado: Western Interstate Commission for Higher Education, 1959.

Barton, Allan H. *Organizational Measurement and its Bearing on the Study of College Environment*. Monograph No. 2. New York: College Entrance Examination Board, 1961.

Ben-David, Joseph. "Scientific Productivity and Academic Organization in Nineteenth Century Medicine," *American Sociological Review*, 25: 828-843, 1960.

Blank, David M. and George J. Stigler. *The Demand and Supply of Scientific Personnel*. New York: National Bureau of Economic Research, 1957.

Brown, Newell. "The Manpower Outlook for the 1960's: Its Implications for Higher Education," *Higher Education*, 16: 3-6, 1960.

Bunnell, Kevin, ed. *Faculty Work Load*. Washington, D. C.: American Council on Education, 1960.

Bush, George Pollack and Lowell H. Hattery, eds. *Scientific Research: Its Administration and Organization*. Washington, D. C.: American University Press, 1950.

"College and University Faculties: Practices," *Higher Education*, 16: 19, 1960.

Cooley, William W. "Attributes of Potential Scientists," *Harvard Educational Review*, 28: 1-18, 1958.

David, Henry, ed. *Education and Manpower*. New York: Columbia University Press, 1960.

Dickason, Donald E. *Plan of Position Classification for Colleges and Universities*. Champaign, Illinois: College and University Personnel Association, 1960.

Diehl, Harold S., Margaret D. West, and Robert W. Barclay. "Medical School Facilities in the National Emergency," *The Journal of Medical Education*, 27: 233-243, 1952.

Diekhoff, John S. *The Domain of the Faculty in our Expanding Colleges*. New York: Harper Bros., 1956.

Elliff, Mary. *Some Relationships Between Supply and Demand for Newly Trained Teachers*. New York: Bureau of Publications, Teachers College, Columbia University, 1935.

Evans, John M. "Problems Concerned with Faculty Load Studies," *Conference on Institutional Research in Higher Education*, Northern Illinois University Research Bulletin No. 6, 1962.

Gage, N. L. "The Appraisal of College Teaching," Journal of Higher Education, 32: 371-374, 1961.

Gottlieb, D. "Teachers and Researchers in American Universities," Journal of Higher Education, 32: 452-454, 1961.

Gray, William S. The Training of College Teachers. Chicago: University of Chicago Press, 1930.

Gustad, John W., ed. Faculty Utilization and Retention. Proceedings of a Regional Conference Sponsored by the New England Board of Higher Education, May 5-6, 1960. Winchester, Mass.: by the Board, 1960.

Henderson, Norman B. "The Relationship Between the Attitudes of Scientific Research Workers Toward the Components of Scientific Work and Their Performance Rating." Doctoral dissertation, University of Southern California, 1953.

Hinsey, J. C. "Maintenance of a Continuing Supply of New Faculty Members," Journal of the Association of American Medical Colleges, 25: 379-395, 1950.

Horner, Harlan Hoyt. Dental Education Today. Chicago: University of Chicago Press, 1947.

Jamrich, John X. Faculties of the Michigan Institutions of Higher Education. Staff Study No. 10. The Survey of Higher Education in Michigan, 1958.

Joint Committee on Atomic Energy. Development of Scientific, Engineering, and Other Professional Manpower. 85th U. S. Congress, 1st Sess. Washington, D.C.: U. S. Government Printing Office, 1957.

Joint Staff for Liaison Committee. A Study of Faculty Demand and Supply in California Higher Education, 1957-1970. Berkeley, Calif.: University of California Press, 1958.

Kidd, Charles V. American Universities and Federal Research. Cambridge, Mass.: Belknap Press, 1959.

Knapp, Robert H. "Changing Functions of the College Professor." The American College: A Psychological and Social Interpretation of the Higher Learning, Nevitt Sanford, ed. New York: John Wiley and Co., 1962.

Lambert, Sam M. and David Iwamoto. "Teaching Load," Encyclopedia of Educational Research, C. W. Harris, ed. New York: Macmillan Company, 3rd ed., 1960.

Lazarfeld, Paul E. and Wagner Thielens, Jr. The Academic Mind. Glencoe, Ill.: Free Press, 1958.

Litchfield, Edward H. "Organization in Larger American Universities," Journal of Higher Education, 30: 353-364, 1959.

Lathrop, Robert L. "Assessment of Faculty Satisfactions and Dissatisfactions Through Mobility Studies," The Role of Institutional Research in Planning, L. J. Lins, ed. Madison, Wis.: The University of Wisconsin, 1963.

MacKinnon, Donald W. "Characteristics of the Creative Person: Implications for the Teaching-Learning Process," Current Issues in Higher Education. The Proceedings of the Sixteenth Annual National Conference on Higher Education, Association for Higher Education, National Educational Association, 1961.

McGee, Reece. "Needed Research in Special Areas: Faculty Characteristics, Non-Academic Personnel, Graduate Students," The Role of Institutional Research in Planning, L. J. Lins, ed. Madison, Wis.: The University of Wisconsin, 1963.

Miernyk, William H. and Moris A. Horowitz. "Engineering Enrollment and Faculty Requirements, 1957-1967," Journal of Engineering Education, 48: 279-859, 1958.

Millett, Fred B. Professor. New York: Macmillan Company, 1961.

Millett, John D. The Academic Community: An Essay on Organization. New York: McGraw-Hill, 1962.

National Academy of Sciences. The Status of Research and Manpower in Meterology. Washington, D.C.: National Research Council, 1960.

National Education Association. "College Teachers: Demand Exceeds Supply," National Education Association Research Bulletin, No. 39, October, 1961.

————. Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1957-58 and 1958-59. A National Education Association Research Report, 1959.

————. A Policy for Scientific and Professional Manpower. New York: Columbia University Press, 1953.

————. The Utilization of Scientific and Professional Manpower. Proceedings of a Conference. New York: Columbia University Press, 1954.

National Science Foundation. Scientific Research and Development in Colleges and Universities, Expenditures and Manpower, 1953-54. Washington, D.C.: U. S. Government Printing Office, 1959.

————. Scientific Research and Development of Nonprofit Organizations, Expenditures and Manpower, 1957. Washington, D.C.: U. S. Government Printing Office, 1961.

The Pay of Professors. A Report on the Ford Foundation Grants for College Teacher Salaries. New York: The Ford Foundation, 1962.

Riesman, David. Constraint and Variety in American Education. Garden City, N.Y.: Doubleday, 1958.

Rourke, Francis E. and Glenn E. Brooks. "The 'Managerial Revolution' in Higher Education," Administrative Science Quarterly, 9: 154-181, 1964.

Somit, Joseph and Albert Tanenhaus. American Political Science: a Profile of a Discipline. New York: Atherton Press, 1964.

Steelman, John R. Manpower for Research, Vol. IV, Science and Public Policy. A Report to the President by the Scientific Research Board. Washington, D.C.: U. S. Government Printing Office, 1947.

Strauss, Anselm L. and Lee Rainwater. The Professional Scientist: A Study of American Chemists. Chicago: Aldine Press, 1962.

Tanenhaus, Joseph, Sidney G. Roth, and Robert H. Lilienfield. "Faculty Satisfactions and Dissatisfactions: A Methodological Study." The Role of Institutional Research in Planning, L. J. Lins, ed. Madison, Wis.: The University of Wisconsin, 1963.

"Ten-Year Objectives in Higher Education Staffing, 1960-61 Through 1969-70," Higher Education, 17: 3-4, 1961.

Tolliver, Wayne E. and Hazel C. Poole. Faculty and Other Professional Staff in Institutions of Higher Education, 1st Term, 1957-58. Washington, D.C.: U. S. Government Printing Office, 1959.

Tyndall, D. Gordon. "Budgetary Implications of Faculty Load Studies," The Role of Institutional Research in Planning, L. J. Lins, ed.

Wellemeyer, J. F., Jr. Classifications for Surveys of Highly Trained Personnel. Washington, D.C.: American Council of Learned Societies, 1953.

Wellemeyer, J. F., Jr. and Pauline A. Lerner. "Higher Education Faculty Requirements in the Humanities and the Social Sciences, 1952-1970," School and Society, 78: 145-152, 1953.

Wolfle, Dael. America's Resources of Specialized Talent. New York: Harper and Brothers, 1954.

Woodburne, Lloyd S. Principles of College and University Administration. Stanford, Calif.: Stanford University Press, 1958.

Wriston, Henry M. Academic Procession. New York: Columbia University Press, 1959.

Student Data

Eells, Walter Crosby and Harold A. Haswell. *Academic Degrees*. (Bulletin No. 28, OE-54008) Washington, D.C.: Office of Education, Department of Health, Education, and Welfare, 1960.

Joint Committee on Data and Definitions in Higher Education, American Association of Collegiate Registrars and Admissions Officers. *Handbook of Data and Definitions in Higher Education*. Washington, D.C.: American Council of Education, 1962.

Lovejoy, Clarence E. *Lovejoy's College Guide*, 1961-62 edition. New York: Simon and Schuster, 1961.

Mahn, Robert E. *A Glossary of Terms Used by Registrars and Admissions Officers*. Athens, O.: American Association of Collegiate Registrars and Admissions Officers, 1956.

Facilities: Building Space

California and Western Conference Cost and Statistical Study. New York: Fund for the Advancement of Education, 1960.

Dahnke, Harold L. "Some Random Thoughts on Space Utilization," *College and University*, Vol. 36 (Fall 1960).

Jamrich, John X. and Ruth Weinstock. *To Build or Not to Build*: A Report on the Utilization and Planning of Instructional Facilities in Small Colleges. New York: Educational Facilities Laboratories, Inc., 1962.

Jones, Donald A. *Physical Facilities Analysis for Colleges and Universities*. Oneonta, N. Y.: American Association of Colleges for Teacher Education, 1958.

A Master Plan for Higher Education in California, 1960-1975. Sacramento: California State Department of Education, 1960.

Russell, John Dale and James I. Doi. *Manual for Studies of Space Utilization in Colleges and Universities*. Athens, O.: American Association of Collegiate Registrars and Admissions Officers, 1957.

U. S. Department of Health, Education, and Welfare, Office of Education, OE-51004-12A: *Space Utilization Bibliography*, January 1964.

Zanfino, Frank J. "How Many Students Can Your College Accommodate?" *College and University Business*, Vol. 34 (May 1963).

Facilities: Equipment

Barton, J. H. "Inventories of Municipal Properties," *Comptroller*, May 1931.

Bass, Morris F. "Study of Equipment Inventory and Control." (Unpublished Master's thesis, University of Tennessee, August 1962).

Boozer, H. W. "Some Aspects of Plant Ledgers and Public Utility Plant Accounting," *Bulletin of the National Association of Cost Accountants*, September 1937.

Calvert, Robert C. *Manual of Instructions: Property Inventory Procedures*. Austin, Texas: Controller of Public Accounts, 1951.

Carruthers, E. A., *et al*. "Inventories," *Minutes of the Association of University and College Business Officers of the Eastern States*, 1938.

Cataloguing Handbook H2-1, Federal Supply Classification (Groups and Classes). Part 1. Washington, D.C.: U.S. Government Printing Office, 1961.

Cataloguing Handbook H2-2, Federal Supply Classification (Numeric Index of Classes). Part 2. Washington, D.C.: U.S. Government Printing Office, 1961.

Cataloguing Handbook H2-3, Federal Supply Classification (Alphabetical Index). Part 3. Washington, D.C.: U.S. Government Printing Office, 1961.

Clapp, Wilfred F. "The Need for Plant Research," in *The American School and University, 1947-48*, New York: American School Publishing Corp., 1948, pp. 30-31.

College and University Facilities Survey, Part 1. (Circular #540) Washington, D.C.: Office of Education, U.S. Department of Health, Education, and Welfare, 1959.

Ellis, Cecil A. "The Control and Valuation of Stores," *Canadian Chartered Accountant*, December 1937.

Gilmore, Charles H. "Accounting: Financial and Property," *Review of Educational Research*, April 1938.

Grotaes, Harold B. "Use of Property Ledgers in City Departments," *American City*, July 1939.

Guide for Implementing Handbook III, Property Accounting for Local and State School Systems, (OE-23029). Washington, D.C.: Office of Education, U.S. Department of Health, Education, and Welfare.

Hackett, R. P. "Property Accounts for Municipalities," *Accounting Review*, March 1937.

Hamon, Ray L. "Needed Research in the School-Plant Field," *Review of Educational Research*, 18: 5-12, February 1948.

Hayes, D. K. "School Plant Bibliography," in *The American School and University*, New York: American School Publishing Corp., 1955.

Healy, Harry T. "Inventory Problems and Valuation of Plant Assets," *Proceedings of the Western Association of College and University Business Officers*, September 1939.

Holtman, F. W., and C. J. Berry. "Operation of the Equipment Fund of the City of Minneapolis," *American City*, March 1932.

Holy, T. C. "Basic Research Urgently Needed," *Nation's Schools*, 41: 28-30, February 1948.

Hommer, W. A. "Plant Ledgers and Plant Accounting," *Harvard Business Review*, January 1936.

Hospital Equipment Planning Guide. (Public Health Service Publication No. 822) Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1961.

Income Tax Depreciation and Obsolescence, *Estimated Useful Lives and Depreciation Rates*, (Bulletin F). Washington, D.C.: U.S. Treasury Department, Bureau of Internal Revenue, 1942 (rev.).

Joyal, Arnold E. "School Plant and Equipment Research," *Phi Delta Kappa*, 30: 8-10, September 1948.

Lindstrom, J. O. "Inventory Procedure for Capital Equipment," *Proceedings of the Western Association of College and University Business Officers*, 1937.

_______. "Inventory Procedure for Capital Equipment," *Educational Business Manager and Buyer*, April 1938.

Mallory, L. F. "Inventory of Plant Assets," *College and University Business*, December 1949.

McCuen, T. L. "School Property Accounting in California," *American School Board Journal*, July 1930.

Middlebrook, W. T. "Responsibility of the Central Business Office for the Maintenance and Protection of Capital Equipment," *Minutes of the Twentieth Annual Meeting of the Association of College and University Business Officers*, 1930.

Mills, Walter J. "Accounting Procedures for Physical Plant Records," *Proceedings of the Eastern Association of College and University Business Officers*, December 1941.

"Permanent Property Control Records," *Nation's Schools*, 60: 47-48, December 1957.

Peterson, A. W. "Physical Plant Accounting," Minutes of the Twenty-eighth Meeting of the Association of University and College Business Officers, 1938.

Property Classification Code Manual. Association for Educational Data Systems (Special Publication No. 072), January 1963.

Roberts, C. T. "Why Property Accounting?" School Life, 44: 21-25, Summer 1961.

Slater, Clarence P., and J. Harvey Cain. Inventory of Plant Assets. (Financial Advisory Service Bulletin 16) Washington, D.C.: American Council on Education, 1939.

Thompson, E. "Accounting Problems in Area of Equipment," Proceedings of Association of School Business Officers: United States & Canada, 1956, pp. 152-155.

Walsh, M. B. "Plant Equipment Forms," Bulletin of the National Association of Cost Accountants, October 1935.

Wolfe, H. Grady. "You Can Control Your Property," College and University Business, 27: 54-58.

Organization of Institutional Data and Total Information Systems

Bernhard, Robert D. "All Out For 'Total Systems'," *Systems Management*, July 1962.

Boyd, Alfred G. "A General Approach to Information Systems Design," *Control Engineering*, August 1962.

Bramson, A. D. "Unified Operations Management," presented at the International Systems and Procedures Meeting in Cleveland, Ohio, Business Automation, January 1962, pp. 26-31.

Data Processing, Proceedings of the 1962 International Data Processing Conference of the Data Processing Management Association, 1962.

Dean, Neal J. "Profit Growth Via Information Systems," *Business Automation*, May 1963.

Deatrick, George B. "The Universe Approach to Systems Design," *Data Processing*, September 1962.

Evans, Marshall K. and Lou R. Hague. "Master Plan for Information Systems, *Harvard Business Review*, January-February 1962.

Gallagher, James D. *Management Information Systems and the Computer*. New York: American Management Association, 1961.

Gordon, G. and S. Becker. "Changes in Medical Practice Bring Shifts in Pattern of Power," *The Modern Hospital*, 102: 89ff., February 1964.

Gregory, Robert H. and Richard L. Van Horn. *Automatic Data Processing Systems*, 2nd ed. Belmont, Calif.: Wadsworth Publishing Company, Inc., 1963.

Haskins, M. E. Jr. "Trends in Computer Applications," *Data Processing for Management*, January 1963, pp. 37-41.

Hearle, Edward F. R. and Raymond J. Mason. *A Data Processing System for State and Local Governments*. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963.

Jonker, Frederick. "Total Data Processing," *Data Processing*, April 1962.

Limberg, Herman. "Designing Information Pipelines," *Systems Management*, September 1962.

Meers, Richard E. "Data Collection and Accumulation Closes the Information Processing Loop," *Automation*, January 1963, pp. 70-74.

Skaggs, Bruce. "Computer Assistance to Top Management," *Data Processing*, December 1962, pp. 13-19.

Sloma, Richard S. "Management Alarm Digits," *Data Processing*, March 1961, pp. 9-13.

Spencer, Leslie S. "Data Collection, Data Processing, Information Processing, Data Reduction, Information Retrieval," Data Center, May 1961, pp. 1-2.

Swanson, C. A. "Justification Is Basis for Computer Use," Data Processing, May 1962, pp. 22-24.

Thompson, Victor A. Modern Organization. New York: Alfred A. Knopf, 1961.

Total Systems. Data Processing Library Services, American Data Processing, Inc., 1962.

University-College Information System. White Plains, N. Y.: International Business Machines, Inc., n.d.

Veyette, John H. Jr. "The Impact of Information Retrieval on Corporate Structure," Data Processing, January 1962.

Wessler, Richard L. and R. H. Richart. "Institutional Research in Health Organizations," Hospital Progress, 25: 87-90, June 1964.

Wiley, Claude H. "New Concepts - New Horizons," Data Processing, Vol. IV (1961 NMAA International Conference), pp. 111-117.

APPENDIX C

SUBJECT INDEX

Academic/academic-professional activities:
  administration, 85
  creative activity in art and scholarship, 70-72, 84
  criteria for developing and testing categories of, 65-66
  formal personal education, 86
  intra-university activities, 87-88
  other extra-university activities (excluding public service), 88
  public service, 84-85
  relationship to institutional activities, 218
  research, 78-83
  teaching, 75-77
  teaching through creative activity in art and scholarship, 72-73, 84
  teaching-research, 67-70, 83-84
Academic/academic-professional personnel, 41-44
  activities of, 64-88, 273-275
  basic data items, 44-49, 264-275
  competencies and specialties, 52-58, 270-271, 276-292
  computing full-time equivalents of, 107-115, 293-296
  fractional support from contracts and grants, 100
  full professional life of, 62-64
  full-time support from contracts and grants, 100-102
  measuring activities of, 91-95, 273-275
  new activity concepts related to, 66-73
  operational groupings of data items on, 49-51
  professional identifications of, 53-56
  relating activities to salary, 95-102
  reports and analyses resulting from data on, 395-399, 400-401
  requirements for university system of data on, 51-52
Academic/academic-professional personnel data item list:
  background, qualifications, and experience, 265-271
  distribution of effort, 273-275

  professional assignments and responsibilities, 272-273
Academic life, nature of, 39, 62-64, 91-95, 103
Activity cost concept, relation to budgetary concept, 187-189, 191-193
Activity reporting, academic/academic-professional personnel, 64, 92-95, 103-106, 186-187, 263, 273-275
Administration, 85
American Association of Collegiate Registrars and Admissions Officers, 8, 117, 120
American Council on Education, 8, 33
Association for Educational Data Systems, equipment codes published by, 357
Audit trail, within an equipment inventory, 175-176
Budgetary reporting and activity reporting, 181-182
California and Western Conference Cost and Statistical Study, quoted, 145
Codes:
  fixed equipment inventory, 335
  movable equipment inventory, 354-359
  space inventory, 301-302
  specialty lists, 276
  total information systems, 241-242
College and University Business Administration, 8, 18, 179, 218, 386-387
Communication, need for, among administrators, 15
Communication and organizational structure, 34-35
Compatibility of data and data systems, 27-28, 30
Complex data, 24-26
Cost studies, based on activity costs, 189-191
Council of Graduate Schools in the United States, 264
Creative activity in art and scholarship, 70-72, 84, 372
Current expenditures, 184
Data, necessity of relevance to user, 33-34, 224
Data organization, problems of, 196-201
Data organization chart, 16, *17*, 18, 21-22, 39, 179, *202*, 225-226
  activities of institutions, 213-218, 369-387

characteristics of institutions, 219
facilities data, 206-207
feedback, 219
financial data, 210-212
manpower data, 206
organizational structure, 208-209
output of institutions, 219
population data, 210
programs of institutions, 218-219
student data, 205-206
Data systems, relation to educational objectives, 33-34
Datum, definition of, 224
Decision-making, 8-13, 229-230, 245-246
Definitions, need for, 19, 197, 240-241, 250
Definitions and classifications, principles governing construction of, 19-21
Department of Defense, equipment codes published by, 358
Depreciation, physical plant, 185
Dollar cutoff value, as a criterion for differentiating equipment from supplies, 162-163
Dollar measurements of institutional activities, 181-182, 187-193, 211-212, 386-387
Effort, as a concept of measurement, 91-95
Endowment and aid funds, 185
Enrollments, measurements of, 138-139, 388-393
Equipment (See Movable equipment inventories, Fixed equipment inventories)
Equipment inventories in colleges and universities, status of, 163n, 164-166
Facilities data (see Space inventories, Space utilization analyses, Fixed equipment inventories, Movable equipment inventories)
Feedback, 219, 226, 229-230
Financial system, flow of funds through, 180-181
Fixed equipment inventories:
  definition of fixed equipment, 161-164
  forms and instructions, 334-350
Formal personal education, 86
Fullness ratio, as a measure of classroom utilization, 154-155
Funds, relationship between source and application of, 183-184

Handbook of Data and Definitions in Higher Education, 8, 19, 117, 120, 126-142

Higher education, changing role in society, 9-11

Hours per week of use, as a measure of classroom utilization, 154-155

Information:
  - comprehensive approach to problem of, 13-15
  - data and, 224, 235-236
  - and decision-making, 12
  - management of, 229-230

Institutional activities:
  - creative activity in art and scholarship, 372
  - instruction, 369-371
  - problem of describing in monetary terms, 186-187, 211-212
  - public services, 373-375
  - relation to academic/academic-professional activities, 218
  - research and development, 371-372
  - supporting services, 375-386
  - teaching through creative activity in art and scholarship, 372-373
  - teaching-research, 371

Institutional data:
  - complex or derived, 24-25
  - need for, 3, 5, 195
  - prime or basic, 24-25
  - uses of, 5
    - day-to-day operations, 5-6
    - decision-making, 8-13
    - reporting to agencies, 7-8, 230

Institutional self-analysis, need for, 33-34

Institutions of higher education:
  - administration of, 228-230
  - data organization chart for, 17, 202
  - dependence of society upon, 9-11
  - management of, 245-252
  - manpower, basic divisions of, 39-41
  - objectives, 39, 218-219, 221-222
  - organizational structure, 221-224
  - relationship to Federal government, 10
  - systems analysis of, 252

Instruction, 369-371

Intra-university activities, 87-88

Inventory forms and instructions:
  fixed equipment inventory, 334-350
  nonresidential buildings inventory, 321-330
  nonresidential rooms inventory, 301-316
  residential buildings inventory, 317-321
Manpower information crisis, manifestations of, 45
Measuring and reporting university operations, steps in, 227
Movable equipment inventories:
  allocation of equipment costs, 167-171
  control system, 171-176
  data requirements, 166-167, 350-354
  definition of movable equipment, 161-164
  group items, 364-365
  institutionally constructed equipment, 366-367
  methods of marking and identifying equipment, 365-366
  objectives, 164-167, 354-361
  summary of objectives and data requirements, 362-364
National information system, 8, 30-31, 220
National Institutes of Health, 56, 123
National Register of Scientific and Technical Personnel, 57, 276
National Science Foundation, 3, 56, 59, 123, 276
Objectives of the Project, 4-5
Other extra-university activities (excluding public service), 88
Part-time academic/academic-professional personnel, computing full-time equivalents of, 107-115, 293-296
Person-specialists, 53, 222
Pilot demonstrations, need for, in data areas studied, 32
Planning and control, 227, 228-229
Plant funds, 184-185
Prime data, 24-26
Professional persons, their role in society, 62
Public service(s), 84-85, 373-375
Questionnaires and surveys, potential danger of, if ad hoc definitions used, 22-23
Recommendations of the Project:
  academic/academic-professional personnel, 58-60, 88-89, 115-116
  facilities data, 176-177
  financial data, 193
  general, 36-37

  organization of institutional data, 231-232
  student data, 142
  total information systems for colleges and universities, 261
Recommended data items:
  academic/academic-professional personnel, maximum-minimum list, 265-275
  building space, 150-152
  institutional activities (list), 369-386
  movable equipment, maximum-minimum list, 350-354
  space utilization (list), 331
  students, minimum list, 128-129
  teaching and research specialties (list), 277-292
  (See also Inventory forms and instructions)
Research:
  categorized according to primary of intent and immediacy of consequences, 79-81, 371-372
  categorized by source of support, 81-82, 371-372
Responsibility center, definition of, 182
Resources, institutional, 203-205
Salaries, relation of professional activities to, 63-64, 95-99
Salary studies, 399
Space inventories:
  classification of space, 149-150
  forms and instructions, 301
    nonresidential buildings, 321-330
    nonresidential rooms, 301-316
    residential buildings, 317-321
  information required, 150-152
  maintenance of data, 152
  personnel required, 297-299
  purposes of, 144-146
  sources of data, 299-300
Space utilization analyses:
  data required, 331
  measures of room utilization, 154-155, 331-332
  need for perspective about, 152-154
  types of room use studies, 159-160
Specialty lists:
  anthropology, 279
  archeology, 280
  architecture, 280
  art, 280
  clinical medicine, 277
  commerce and finance, 280-283
  dentistry, nursing, veterinary medicine, and other health-related specialties, 278-279
  education, 283-284

geographic or national areas, 291-292
history, 284
home economics, 284-285
language and literature, 292
law, 285-286
law enforcement, 286
library science, 290
literature, 287
music, 287-288
philosophy, 288
political science, 288-289
social work and welfare, 289
speech, 289-290
Student credit hours, 136-139, 390n
Student data:
current educational program data, 129-130, 134-141
historical-educational data, 129, 133-134
measures of student load, 136-138
minimum items recommended by AACRAO, 130-142
minimum items recommended by the Project, 127-130
personal data, 128, 131-133
reports and analyses resulting from, 124-126, 388-395, 400-401
uses of, 121-124
Support personnel, 41
Supporting services, 375-386
Systems, nature of, 247
Teaching, 75-77 (See also Instruction)
Teaching through creative activity in art and scholarship, 72-73, 84, 372-373
Teaching-research, 67-70, 83-84, 371
Technological society, implications of, for higher education, 9-11
Total information systems for colleges and universities, 5, 12-13
basic data files, 403-409
coding, 241-242
conditions for achieving, 237
cost of, 258-259
definition of, 226, 228, 235-237
file design, 255-257
limitations of, 13, 226, 253
major systems of data, 253-255
operating subsystems, 257-258
outline for, 410-415
planning for, 244
records and files, 242
reports, 226, 230, 242-243
types of data processing organization, 243
types of input data, 238-239
Total systems, concept of, 234-235
U. S. Office of Education, 7, 24-25, 33, 123
University of California, equipment coding system designed by, 358

University systems, nature of, 247-248
Usable life, as a criterion for differentiating equipment from supplies, 163-164

☆U. S. GOVERNMENT PRINTING OFFICE : 1967 O - 272-328